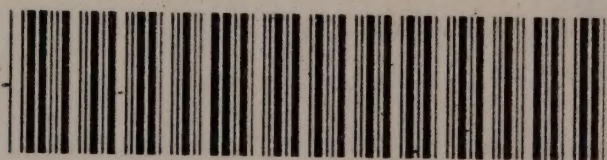






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REPORT

TO THE

HON. THE COMMISSIONERS OF SEWERS

OF THE

CITY OF LONDON,

UPON

CAST IRON TRAMWAYS,

BY

WILLIAM HAYWOOD, M. INST. C.E., F.R.I.B.A.,

ENGINEER AND SURVEYOR TO THE COMMISSIONERS.

20th December, 1859.

LONDON:

PRINTED BY M. LOWNDS, 148 $\frac{1}{2}$, FENCHURCH STREET, CITY. E.C.

1860.

REPORT

HON. THE COMMISSIONERS OF REVENUE
CITY OF LONDON

CAST IRON TRAMWAYS

WILLIAM HAYWOOD, M. INST. OF C.E.S.

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*At a Meeting of the Commissioners of
Sewers of the City of London, held
at the Guildhall, of the said City, on
Tuesday, 20th December, 1859 :—*

The Engineer and Surveyor laid before the Court
a Report as under.

ORDERED—

That the same be printed, and a copy sent to
every member of this Court, and of the Court of
Common Council.

JOSEPH DAW,

Principal Clerk.

CAST IRON TRAMWAYS.

TO THE HONORABLE THE COMMISSIONERS OF
SEWERS OF THE CITY OF LONDON.

SEWERS' OFFICE, GUILDHALL,
20th December, 1859.

GENTLEMEN,

In pursuance of your instructions, I have carefully considered the application made to you by Mr. John Baldry Redman, in which he proposes to lay Cast Iron Tramways within the City of London, in lieu of those formed of granite which are at present employed.

Before entering upon the consideration of the Tramways specially referred to me, it may be useful to dwell a short time upon the subject generally.

The term Tramway was originally given to wheel-tracks formed of wood, and subsequently of iron, laid at an uniform width, and as level as circumstances would permit, so as to reduce the friction, and enable the waggons in the collieries of the North of England to be drawn with greater ease, these Tramways ultimately led to the employment of lines of rails, and carriages with flanged wheels

adapted to them, and the simple wheel-tracks were abandoned—the colliery railways were, in fact, the precursors of the railroads of the present day.

With the same object, wheel-tracks of stone and metal were laid experimentally upon common roads about the beginning of the present century: the Commercial Road, from the West India Docks to Whitechapel was so laid under the superintendence of Mr. James Walker, in the years 1829, 1830. The track was formed of blocks of Guernsey, Aberdeen, and Herm granites, 18 inches wide, 12 inches in depth, and in length varying from 3 feet to 6 feet (this is the road referred to by Mr. Redman in his application). In 1836, a similar Tramway was for the first time laid in the City of London, and since that period they have been much extended within its area.

The utility of Tramways in the reduction of draught was early known; but the actual saving in labour, effected by their adoption, was not ascertained until the year 1830, when Sir John McNeil applied the dynamometer to determine the relative values of different kinds of road surfaces in the economization of horse power. It was then shown that a horse could draw, upon a well-made pavement, about four times as much weight as upon a gravel road as then made; and by subsequent

investigation it was proved that a horse could draw about twice as much upon a Tramway as upon a stone pavement. The pavements experimented upon it is true were far from being as smooth and perfect, as those of the best description at the present day ; therefore the comparative saving would probably not now be so great ; but the investigations made by Morin and others lead to the conclusion that there would not be a very material difference, unless the pavement was new ; and the results undoubtedly are, that a large saving in labour is effected by their use, as compared with pavements in an average condition.

Of their utility, therefore, in respect of the reduction of draught, no more need be said ; but in towns having great traffic, such as the City of London, other benefits result from their use. Their advantages in such situations may be stated as follows :—

Firstly—The diminution of friction, the consequent facilitation of the draught of vehicles, and reduction of the strain of horses.

Secondly—The diminution of noise and vibration, and the increased comfort, both to travellers and inhabitants, consequent thereupon.

Thirdly—An increased duration of surface, the consequent diminution in the frequency of surface

repairs, with the inconveniences attending such reparations.

In addition to the foregoing, they are very useful in streets having much pedestrian traffic; where the footway space is small; they prevent, to a large extent the splashing from the wheels of vehicles—are always cleaner and drier than ordinary pavements, and are more readily kept clean by the scavengers.

For many reasons therefore, the adoption of Tramways where practicable, in large and crowded cities, is desirable.

Within the City of London and elsewhere in the Metropolis, the Commercial Road excepted, they were until recent years, applied in narrow streets only,—lines for both wheels being laid where but a single line of carriage traffic could pass. A few years ago, the rapid degradation of the breasts and channels in certain important thoroughfares, caused by the near wheels of vehicles travelling upon the same track, induced me to lay down in some of them a single line of tram-stone next to the kerbs,—the main object was to obtain increased duration, and the avoidance of frequent reparation in streets so thronged; and the improvement in that respect has been considerable; but

owing to their being laid upon one side only, the other advantages, before enumerated, are only realized in a minor degree.

The traffic in those streets is now such as to render it difficult to maintain even those tram-stones in a good condition for a long period. The wheels have cut ruts in the edge of those in Fenchurch Street, averaging three quarters of an inch in depth, within a period of twelve months; the same has occurred in Leadenhall Street, in a much shorter space of time; and in other places where the ordinary paving only is laid, it seems that the tram-stones, and channels, will have to be replaced with new every year if they are to be maintained in a thoroughly good state of repair.

The Granites used have been those of Devonshire or Aberdeen, but chiefly the latter; those having been considered the hardest which could be used consistently with safety. In the present year Tram stones of Guernsey of less width than those usually laid were put down in the Poultry, next to the kerbs, and their duration will certainly be greater than that of the other materials; but, nevertheless, in six months, a very perceptible wear has taken place upon their edges. Now Guernsey is the hardest granite in the London market, and if that also is rapidly worn away, I know of no other

which could be had recourse to in the hope of a greater durability.

Therefore, the adoption of the hardest material which the safety of the traffic will admit of, becomes a matter of necessity, and Iron at once suggests itself for the purpose; the fear that it may prove seriously slippery, has been the only obstacle hitherto to its employment; the same fear has operated against the employment of Guernsey granite, and that both are more so than Devonshire and Aberdeen is probably the case, but the experience of practice is wanting to justify the fears that their employment is not consistent with safety; the question, indeed, should be put beyond speculation, and a trial of both be made, more especially as the Iron carriage-way pavement laid down a short time ago in Leadenhall Street was certainly not more slippery, if so much, as the ordinary pavements in use; and Guernsey granite has been employed as a Tramway extensively for thirty years past upon the Commercial Road, without more danger having been observed to arise from its use than from the other Granites, whilst at Liverpool a material which takes as high a polish as marble is employed for a similar purpose, and Granites harder and far more liable to wear slippery than Aberdeen are used for the pavements of the Streets of many of the northern towns.

Having shown that it is yearly becoming more and more needful to employ, if possible, a material of greater power, to sustain a severe traffic, I will proceed to a consideration of Cast Iron Tramways.

The Tramway proposed by Mr. Redman is formed of hollow boxes of Cast Iron, each box being 6 feet in length, 2 feet in width, and 9 inches in depth; their thickness being at the sides about $\frac{1}{2}$ an inch, and the tops and bottoms about $1\frac{1}{4}$ inches, the surface upon which the wheels are to travel have raised projections of a diamond pattern, the diamonds being about 3 inches square across, and set diagonally upon the line of draught. The space between the diamonds is 1 inch, and the depth $\frac{3}{4}$ of an inch, the whole surface is therefore covered with a reticulation of grooves, which, from their proportions, are not likely to render the way less valuable in respect of traction; but, nevertheless, will diminish the chances of slipping, should a horse get his foot upon them—their character will be better understood by reference to the accompanying drawing, upon which wheel tracks of both descriptions are shown.*

For comparison between these Tramways, and those hitherto employed in the Metropolis, I avail myself of the data obtained upon the Commer-

* See page 20, 21.

cial Road, where records have been kept with great care, and a judgment not often shown in such matters; these records I have had produced before me, and have every reliance upon their correctness; the data so furnished are the more valuable, inasmuch as they exist in relation to the Granite and Iron surfaces upon the same Road, and subject to nearly the same amount of traffic, and therefore present more favourable means of comparison than usually can be found in actual practice.

AS TO DURATION.

The Tramway in the Commercial Road, laid in 1829-30 is principally of Aberdeen, Herm, and Guernsey, the proportion of the former being the largest. The length of Tramway is altogether 2 miles of wheel track,* the annual traffic to which it has been subject I assume to have been about 118,000 vehicles; the tyres of their wheels varying from $2\frac{1}{2}$ to 9 inches, the latter width being, however, exceptional, and the velocity from $3\frac{1}{2}$ miles to 7 miles per hour. The actual traffic upon the road is greater than this, but deductions have been made for vehicles leaving the tramways, and only traversing portions of its length, or not traversing it at all, and the traffic above stated may be taken to represent that which goes over its entire length.

* Two miles of single line, or one mile of line for two wheels, or complete tramway.

The loss upon the Aberdeen stones, including that worked off in the periodical reparations, has been found to be $4\frac{1}{2}$ inches in the 30 years; an Aberdeen Granite tramway of similar dimensions may therefore be taken to be worn out in that time, under the same conditions of traffic.

The loss upon an Iron plate, subject in every respect to the same usage, has been about 1-5th. inch in 9 years, which is equal to a loss of 1 inch in 45 years.

It is assumed by Mr. Redman that one surface of his Tramway will endure 24 years, that it will then turn, and the other face endure a similar period, its total service being 48 years, and this assumption seems supported by the data quoted.

AS TO SAFETY.

This is undoubtedly one of the most important subjects of inquiry, and it is, unfortunately, not so capable of the same determination as other points, for no experiments that I am aware of have been made that do more than give general assistance in arriving at a correct conclusion.

The question of the safety of a paved surface,

has to be considered principally under two aspects—the first, when the surfaces are perfectly dry and clean; the other, when slightly moist and covered, more or less, with dirt, trodden into the condition of a tenacious, homogeneous paste or clay; at other times (the occasions of frost and snow excepted) pavements are not found to be so objectionably smooth as to demand unusual attention, for dry dust or dirt which is, in most situations, more or less scattered upon the surfaces, increases the friction between it and the horses' feet, and increases the safety.

Taking two plane surfaces, one of Aberdeen granite, the other of cast iron—both being worn to the ordinary degree of smoothness by the traffic, and both being perfectly free from dust or dirt—iron would certainly prove under the horses' feet to be the more slippery of the two; but when well covered with mud, in the state before described, although iron might, if anything, be the least secure, there would not be a material difference between them, but the degree would vary according to the tenacity and quantity of the interposing medium,—the slipperiness decreasing as the quantity was greater, and being at its maximum when a thin film or smear of mud was upon the surface; and it is in the latter condition that the iron surface is the most to be feared.

But the Cast Iron Trams proposed are closely grooved, in proportions which have apparently been well considered; the circumstances are therefore, altered, as it is no longer a comparison between two equally smooth plane faces, but between one of granite quite smooth—the other of iron, cut up into diamonds by chases, in which the caulking of horses' shoes may catch—the insecurity must evidently be materially diminished by this, and greater equality in respect of safety, be established between granite and iron.

The periods of frost and snow must not be omitted from the consideration, although their duration in this country is rarely of long continuance. Upon those occasions a plane surface of clean iron is undoubtedly more slippery than granite, but when not in that condition, the degree again depends upon the snow or other material which may cover it; if well covered, there is perhaps no difference between it and granite; when nearly clean it will be the most insecure; but it still remains to be seen whether the deep grooving does not compensate for this.

Under most circumstances of situation or construction, although there may at times be a degree more slipperiness than upon granite, I do not apprehend danger from the cast iron trams as designed by Mr. Redman.

AS TO COST.

The actual value of a pavement is a matter of considerable difficulty in deciding upon. It is arrived at by a due consideration of the first cost, the outlay for the repairs periodically accruing, its duration, and the subsequent value of the worn material.

Upon investigation it appears that the first cost of the iron (taking present prices) will be about 50 per cent. more than that of the granite, but against this must be set the increased duration, which is also 50 per cent. more, whilst the cost of repairs of the granite would five or six times exceed that of the iron; the application of iron to this purpose, being however so limited, satisfactory data as to its cost must be said to be wanting, and opinion must be formed to a large extent by analogous considerations; but the figures before given seem to me capable of being supported, and they result in proving the cast iron to have an economy superior to the granite.

Upon a review of the subject, under the heads of duration, safety, and cost, the advantages of the iron seem to be such as to render it highly expedient that a sufficient trial should be made of it.

These considerations and conclusions, however, refer strictly to the trams when placed in situations similar to the Commercial Road. With regard to their employment in the streets of the City of London, what has been said under the head of security, duration, and cost, will apply with more or less force according to circumstances, but the variations may be expected to be very great according to traffic and locality, and as by reason of the narrowness of its thoroughfares the traffic through them operates most injuriously upon the usual pavements, neither the duration nor the cost assigned to the Tramways whether of granite or iron, upon such highways as the Commercial Road, will be found to hold good in the City; for not only is the degradation here partial, and, therefore, eminently destructive, but the cost of reparation is necessarily more expensive: thus, in the refacing tram-stones in wide roads, the stone can be taken out of its bed, reworked upon the spot, and replaced at once, suitable weather can be chosen, and labour bestowed at the greatest advantage; but within your jurisdiction everything requiring tool-work must be carted away, carted back again, and the whole, when once commenced, by some means be finished off forthwith; the result is, that a very long increase is added to the cost of reparation, and as iron is not susceptible of reparation, and will not require relaying until it is much worn

away, the comparison in respect of cost will so far be still more in its favour in the City than in the Commercial Road; but, on the other hand, a severe but partial wear upon the iron must lead to its early rejection—reparation of its surface being impossible—and as its first cost is great, this may destroy the balance in other respects in its favour.

To give any close opinion as to duration, and cost, without trial, is therefore a matter of impossibility; but whatever may be the actual length of service of either Tramways within the city, it certainly will not approach that in the Commercial Road, although the duration of Iron, relatively to Aberdeen Granite, may not be less; their superior power of resisting wear, will, however save considerably the necessity of reparation, and the inconvenience attending it—there are places in the city where this itself is an object of sufficient importance to justify even an increase in expense to obtain it—London Bridge and the Poultry are, perhaps, the most striking instances of that class of thoroughfare.

Under all circumstances, I beg to recommend that about from 1200 or 1500 feet of Mr. Redman's Cast Iron Tramway be laid experimentally in Leadenhall Street or Fenchurch Street, in single lines, next the kerbs, those being places where reparation must be made in the approaching spring,

and where, from the severe nature of the traffic, the several heads of security, duration, or cost can be advantageously tested and studied; this can be done certainly with but little, if any, pecuniary loss, and I believe with positive gain, and information will be obtained, in which no public body in the metropolis is so much interested in acquiring as your Honorable Commission has.

I have the honor to remain,

GENTLEMEN,

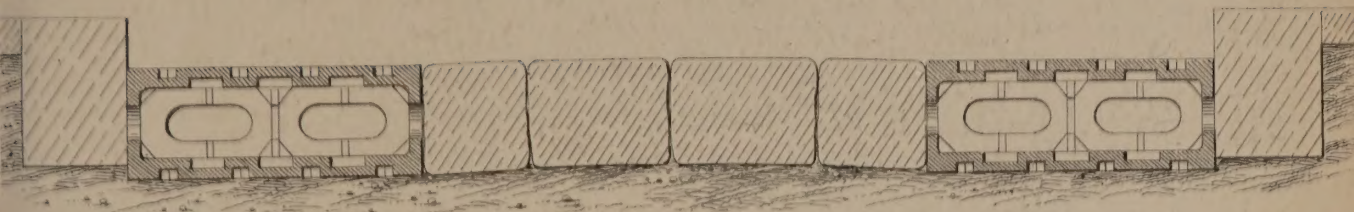
Your most obedient Servant,

WILLIAM HAYWOOD,

Engineer and Surveyor.

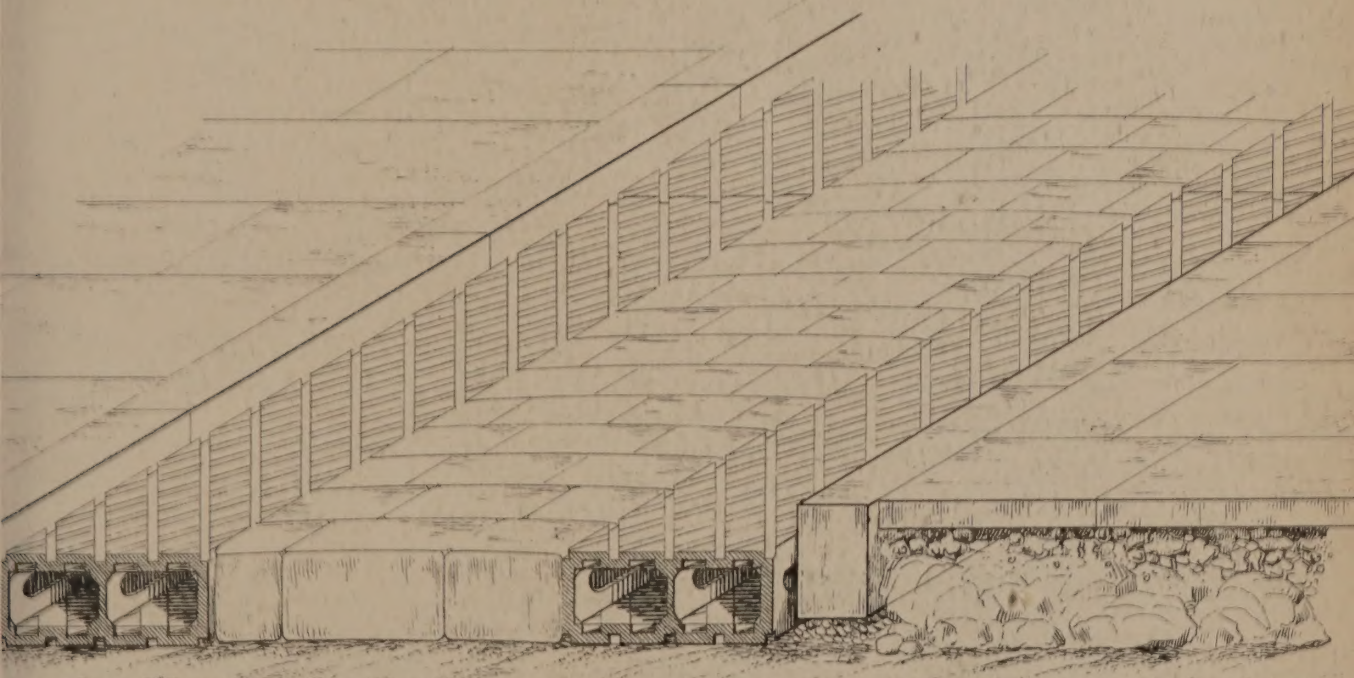
CAST IRON TRAMWAY.

J. B. Redman's Patent.



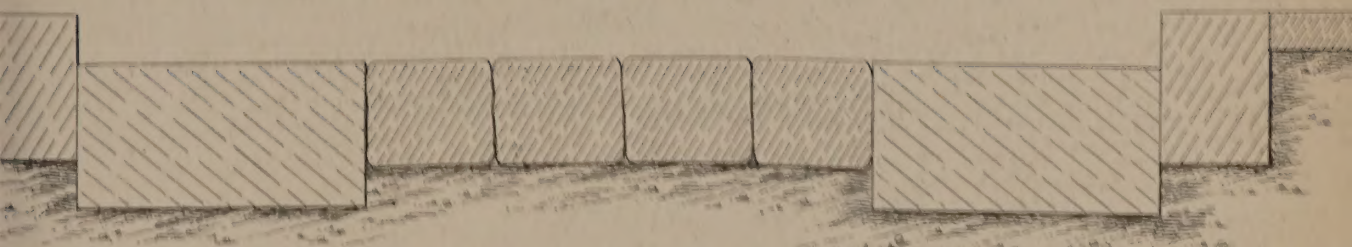
Section.

($\frac{1}{2}$ Inch to 1 Foot.)



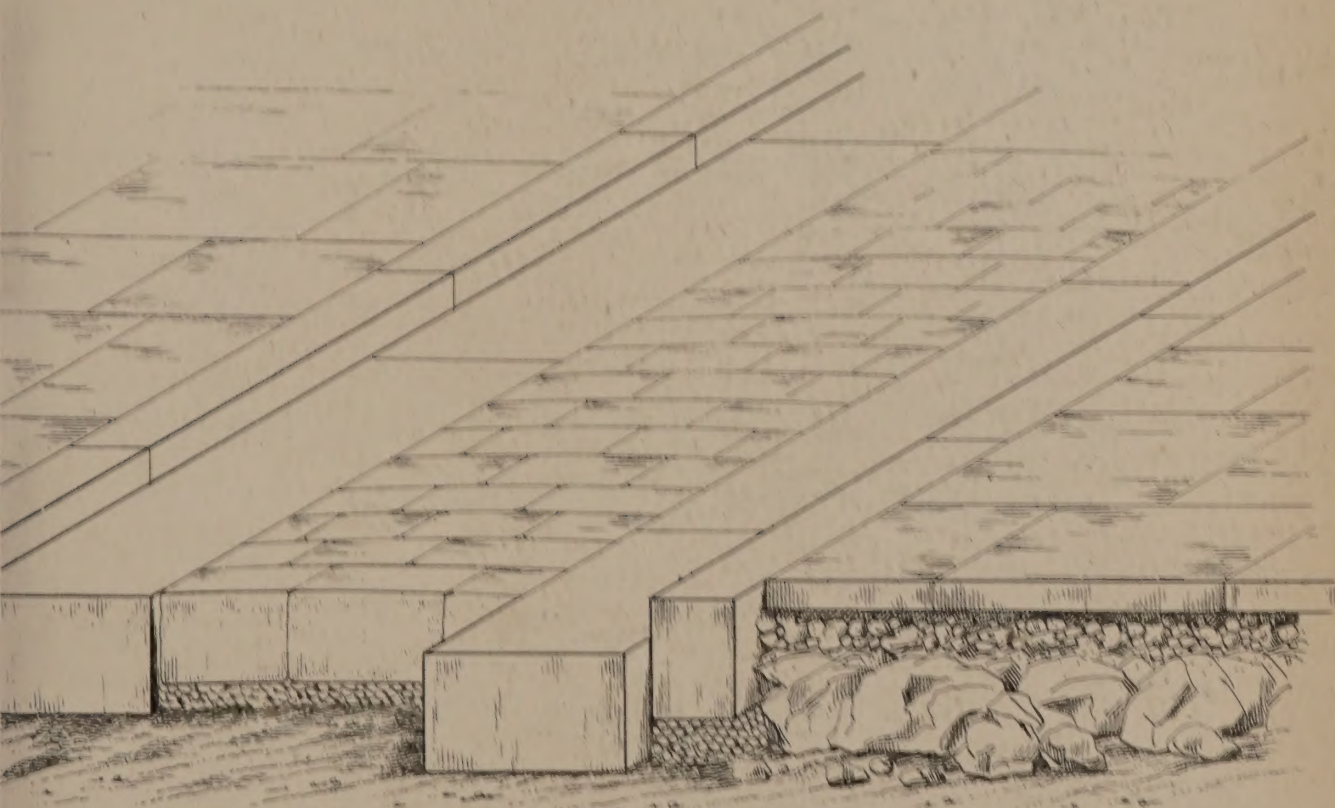
Isometrical Perspective View.

GRANITE TRAMWAY.



Section.

($\frac{1}{8}$ Inch to 1 Foot.)



Isometrical Perspective View.

13

REPORT

TO THE

HON. THE COMMITTEE UPON IMPROVEMENTS
OF THE COMMISSIONERS OF SEWERS

OF THE

CITY OF LONDON,

UPON THE

RAILWAYS AND OTHER COMPANIES

APPLYING FOR POWERS TO CONSTRUCT WORKS WITHIN THE

CITY OF LONDON.

BY

WILLIAM HAYWOOD, M. INST. C.E., F.R.I.B.A.,
ENGINEER AND SURVEYOR TO THE COMMISSIONERS.

23rd January, 1860.

LONDON :

PRINTED BY M. LOWNDS, 148 $\frac{1}{2}$, FENCHURCH STREET, CITY. E.C.

1860.

*At a Meeting of the Commissioners of
Sewers of the City of London, held
at the Guildhall, of the said City, on
Tuesday, 24th January, 1860 :—*

The Engineer and Surveyor laid before the Court
a Report as under.

ORDERED—

That the Report of the Engineer, in reference to
the several Bills in Parliament, be printed and a
copy be sent to every Member of this Court, and to
every Parish within the City of London.

JOSEPH DAW,
Principal Clerk.

N.B.—The Plan referred to herein is at the
Engineer's Office in Guildhall, where it may be
seen.

REPORT

UPON THE

RAILWAYS AND OTHER COMPANIES

APPLYING FOR POWER TO CONSTRUCT WORKS WITHIN THE
CITY OF LONDON.

TO THE HONORABLE THE COMMITTEE UPON
IMPROVEMENTS OF THE COMMISSIONERS OF SEWERS
OF THE CITY OF LONDON.

SEWERS' OFFICE, GUILDHALL,
23rd January, 1860.

GENTLEMEN,

In pursuance of your instructions, I have examined the deposited Plans of the various Railway and other Companies and projectors who apply to Parliament in the ensuing Session for powers to enable them to carry their works into or through the City of London, and who have served notice to that effect upon the Commissioners in their capacity of conservators of the public ways.

THE LONDON AND BLACKWALL RAILWAY COMPANY

Apply for an Act to enable them to provide additional Station accommodation and other works, for which purposes they have scheduled property on the northern side of the existing London and Blackwall Railway between Cooper's Row and the Minories, embracing portions of Gould Square, America Square, and the whole of Hanover Place, Minories. They have also scheduled all the property and public ways in that part of the City which lies on the eastern side of the Minories, and is bounded on the north by the existing railway, and on the south by Sparrow Corner. The public ways proposed to be absorbed or partially interfered with by the scheme, are Gould Square, America Square, Hanover Court, the Minories, Goodman's Yard, Redgate Court, Red Lion Court, Worley Court, Crown and Shears Court, and Vine Street. The Railway is to be carried on arches through the City, and those arches which already span the public ways of Vine Street and the Minories will practically be widened by the addition of others at the side of them. The area of the property in the City (exclusive of the public ways) scheduled for this project is about two acres and three roods.

THE THAMES TUNNEL RAILWAY.

The promoters of this scheme have projected a branch or continuation of their line from Cannon Street Road (where it will join the London and Blackwall Railway) to New London Street, Fenchurch Street. The course of the line is to be south of the existing London and Blackwall Railway, and to enter the City at Sparrow Corner. It will occupy the site of all the houses Nos. 1 to 15, Sparrow Corner, and will cross the Minories between Nos. 97 and 98, and proceed with a slight curve through the southern portion of the Crescent, crossing Colchester Street, Savage Gardens, and Crutched Friars, to the Terminus at New London Street, close to the existing Railway Station at that point. The area of the property in the City (exclusive of the public ways, which are to be spanned by arches, leaving their present levels unaltered) scheduled for the line is about two acres three roods.

LONDON, CHATHAM, AND DOVER RAILWAY— METROPOLITAN EXTENSION.

This Company proposes to extend their Works into the City by crossing the Thames east of and close to Blackfriars Bridge, by a new Railway

Bridge; from that point the main line traverses Blackfriars and Saint Ann's Wharves, crosses Earl Street and Water Street at its junction with Huish Court, and then passes across Union Street, Crescent Place, Little Bridge Street, and Ludgate Hill, across the site of the late Fleet Prison, over Fleet Lane, New Court, Wheat-sheaf Yard, Back Bear Alley, and Bear Alley, to its termination at Brazier's Buildings. The public ways over which this line passes are to be spanned by arches, leaving their levels unaltered, excepting Fleet Lane, Bear Alley, and Wheat-sheaf Alley, which are to be stopped up.

The property in the City scheduled for this line is bounded on the west by the centre of New Bridge Street and the centre of Farringdon Street, on the north by Skinner Street, as far eastwards to No. 9, between Sea Coal Lane and Angel Court, and thence on the east by a line crossing Angel Court, Green Arbour Court, Bishops' Court, and Sea Coal Lane, and thence through Belle Sauvage Yard, crossing Ludgate Hill to Dolphin Court, across Little Bridge Street, Meeting-house Court, and Water Lane, at its Junction with Union Street, and thence across various courts, and through Hood's Wharf to the Thames.

This scheme embraces also two Branch Railways, one starting from the main line about twenty yards north of Ludgate Hill, and leaving the trunk line to the west, crossing Fleet Lane and Sea Coal Lane

at its junction with Bear Alley, crossing Skinner Street at its junction with Snow Hill, which it traverses, cutting through Nos. 76 and 77 in that street, and proceeding with a curve through Cock Court, George Yard, and across West Street at the City boundary: joins the Metropolitan Railway at Victoria Street about forty yards north of West Street; from this Junction Railway there is a Branch, which starting from Snow Hill, occupies the site of the line of houses on the western side of King Street to Smithfield, and entering the site of the late Market for a distance of about twenty-five yards, it there terminates. With the exception of Sea Coal Lane, which it is proposed to stop up, the other public ways will remain unaffected by this scheme, the respective railways passing *under* them. The property in the City, exclusive of public ways scheduled for the London, Chatham, and Dover Railway and Branches, is about thirteen acres.

GREAT NORTHERN, HOLBORN, AND CITY EXTENSION RAILWAY.

This is a Branch from the Great Northern Railway at its intersection with the North London Railway, to Tokenhouse Yard in the City.

The property in the City is not much affected by this line before it arrives at Victoria Street, which

it crosses about sixty feet south of West Street, along which thoroughfare it runs parallel for about 100 yards; then crossing West Street (at its junction with Durham Yard), and also crossing Boar's Head Court, Smithfield Bars, and the northern part of West Smithfield, its course lies parallel to and about 140 feet north of Long Lane; then curving southwards and crossing the eastern end of Barbican, by its junction with Beech Street, Golden Lane, and Red-cross Street, it proceeds across the western end of Three Herring Court, White-cross Street, Milton Street, between Silk Street and Chapel Place, Moor Lane about fifty feet north of Tenter Street, Tenter Street, Union Street, and Little Moorfields at its junction with Short Street, Finsbury Pavement, and London Wall about 140 feet east of Moorgate Street, and thence in a right line to its terminus at Great Bell Alley close to Little Bell Alley.

The property in the City scheduled for this scheme embraces nearly the whole of the space bounded on the north by London Wall East by Saddler's Place, and the Drapers' Gardens south by the property on the northern sides of Copthall Court and Great Bell Alley, and west by the eastern side of Moorgate Street; from London Wall to the western side of Finsbury Pavement about 120 feet in width only is scheduled, and then the whole of the large space bounded by the eastern

side of Finsbury Pavement by Fore Street, White Street, and Milton Street is included. From Milton Street to Victoria Street there is scheduled an average width of 120 feet along the line west of Victoria Street; there is also scheduled a small area of property fronting Holborn in the vicinity of Baker's Court, Furnival's Inn, and Leather Lane; and also between Ely Place and the portion of Field Lane, which is within the City.

This Railway is to be carried on a viaduct through the City, leaving the levels of the public ways unaltered. The entire area scheduled exclusive of public ways is about twenty-two acres; the number of public places in the City, which it appears are to be interfered with or absorbed for the purposes of the Company, is about eighty-seven.

LONDON RAILWAY DEPÔT^A AND STORE-HOUSES COMPANY.

This Company applies to Parliament for powers to make, in connection with the New Markets which are proposed by the Corporation of the City of London, a Railway, Depôt, Store-houses, and other Works. Also a new street or approach from Victoria Street to the intended new works; and a Branch Railway from the Metropolitan Railway, also to connect with the New Markets.

The Railway is to be subterranean, passing directly under the projected new street, and starts from the authorised line of the Metropolitan Railway near its termination at Victoria Street, it then crosses West Street at the City Boundary, and curving through Saint John's Court at its junction with Fox and Knot Court, crosses West Street again, at its junction with Durham Yard, thence through the houses Nos. 75 to 70, West Smithfield, where it terminates at the market.

The property scheduled for this undertaking (exclusive of public ways) is about $2\frac{3}{4}$ acres in area, the public ways scheduled are West Street, Fox and Knot Court, Saint John's Court, and Sharp's Alley, but their levels appear to be intended to remain unaltered. This project is apparently designed to co-operate with the projected Smithfield Market and New Streets.

SMITHFIELD MARKETS, STREETS, AND IMPROVEMENTS.

This is a project of the Corporation of the City of London for the establishment of Markets, Market Places, and Market Houses, partly on the site of West Smithfield and property north of Long Lane, and extending eastwards to Charter-house Street. Among the powers sought to be obtained from Parliament are those to stop up or alter Boar's

Head Court, Smithfield Bars, West Street, and all the various public ways that now traverse the site of West Smithfield.

The property within the City scheduled for the scheme, exclusive of public ways, is about three acres and three roods, which includes, however, a portion of the area of the late market.

The total area of the property scheduled within the City for the various projects before alluded to is about fifty-three acres; the number of public ways of all classes to be spanned by arches about seventy; and the number to be entirely closed up or absorbed by the Companies appears to be about forty-two. Since the year 1846, when as many as nine different Railway Companies gave notice of their intention to apply for powers to enter the City, and an area of about 100 acres was scheduled, so great a demolition of property and appropriation of public way has not been projected.

The merits of the various projects it will be needless and indeed almost impossible with the present amount of information in my possession to attempt to discuss, some will undoubtedly meet a great Metropolitan want, and it will be no easy task to eliminate any as quite useless, but never-

theless, without care, the difficulties of the City traffic may be at certain points rather increased than diminished by the establishment of the Termini and Stations. Some public ways already spanned by arches seem, by the additions proposed thereto, likely to be converted into short tunnels, while other most important lines of street are for the first time to be covered over by arches for portions of their length.

The whole of the schemes will cause a large and serious disarrangement of the sewerage of the various districts, and (with the exception of the project for Metropolitan Markets, which, being entirely for public purposes, cannot be put in the same category as the other schemes) all the Companies propose to absorb for their advantages large areas of the public ways; proper arrangements therefore should be made before these Bills pass into law, by which the sewerage of the City shall be reconstructed or maintained in a proper condition without loss to the Commission; that public ways spanned by arches shall, as much as possible, remain fitted for public purposes; and for the areas of existing public way to be appropriated, some equivalent shall be given which the Commission may determine to be the best for the public generally; these are points upon which I can only report to you after I have had much further information as to what the Companies propose, and after close

investigation of the probable consequences of the completion of their projects; for the present therefore it seems to me absolutely needful that the Commissioners should dissent from the whole of them.

EPPING RAILWAY.

This Railway affects the Commission in its capacity as Burial Board for the City of London; the Line projected is one from Woodford to the Barking Extension, and is proposed to pass through property adjoining the river Roding. East of the City Cemetery, and belonging to the Commission, the total area of the property embraced within the limits of deviation is about twenty-nine acres; the Commission will require protection against the Railway in respect of the drainage of the Cemetery, access to their land, &c., &c., and dissent should therefore be given to the Bill, to enable these matters to be arranged.

I have the honor to remain,

GENTLEMEN,

Your obedient Servant,

WILLIAM HAYWOOD.

3 21
REPORT

OF THE

WORKS EXECUTED

BY THE

HON. THE COMMISSIONERS OF SEWERS

OF THE

CITY OF LONDON,

DURING THE YEAR 1859.

BY

WILLIAM HAYWOOD, M. INST. C.E., F.R.I.B.A.,

ENGINEER AND SURVEYOR TO THE COMMISSION.

6th March, 1860.

LONDON:

PRINTED BY M. LOWNDS, 148 $\frac{1}{2}$, FENCHURCH STREET, CITY. E.C.

1860.

REPORT

WORKS EXECUTED

FOR THE COMMISSIONERS OF SEWER

CITY OF LONDON

DURING THE YEAR 1880

WILLIAM HAYWOOD, M. INST. C.E., F.R.S.E.

ENGINEER AND SURVEYOR TO THE COMMISSIONERS

10, MARK LANE, 1880

LONDON:

PRINTED BY J. COWARD, 10, FLEET STREET, CITY, E.C.

1881

*At a Meeting of the Commissioners of
Sewers of the City of London, held
at the Guildhall, of the said City, on
Tuesday, 6th March, 1860 :—*

The Engineer and Surveyor laid before the Court
a Report as under.

ORDERED—

That the same be printed, and a copy sent to
every Member of this Court, and of the Court of
Common Council.

JOSEPH DAW,
Principal Clerk.

At a Meeting of the Commissioners of
Sewers of the City of London, held
at the Guildhall of the said City, on
Thursday 6th March 1860:—

The Engineer and Surveyor said before the Court
a Report as under.

Ordered—
That the same be printed, and a copy sent to
every Member of this Court, and of the Court of
Commons Council.

JOSEPH DAW
Principal Clerk.

REPORT

OF THE

WORKS EXECUTED BY THE HONORABLE THE COMMISSIONERS OF SEWERS

OF THE

CITY OF LONDON,

DURING THE YEAR 1859.

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REPORT

OF THE

WORKS EXECUTED BY THE HONORABLE
THE COMMISSIONERS OF SEWERS

OF THE

CITY OF LONDON,

DURING THE YEAR 1859.

TO THE HONORABLE THE COMMISSIONERS OF
SEWERS OF THE CITY OF LONDON.

SEWERS' OFFICE, GUILDHALL,
6th March, 1860.

GENTLEMEN,

I have the honor of laying before you my Report upon the works executed by you, and upon your transactions generally during the year 1859.

SEWERS.

The total length of new sewers built was 1,828 feet, of which 1,716 feet were upon the lines of old sewers of insufficient depth, or which, from decay, needed reconstruction.

The question of the better ventilation of sewers

was again discussed during the year, and at length experiment was determined upon, for trying the effect of the application of charcoal to the existing ventilators; the arrangement for the commencement of this experiment is now in the course of being made.

HOUSE DRAINAGE.

The total number of premises drained during the year 1859, was	130
The approximate number of premises known to be drained at the end of the year 1858, was	12,732
The total number of houses of which some record is now possessed as to their being drained, is about	12,862
The approximate number of premises about the drainage of which nothing is known, and which have hitherto been set down as undrained is about	3,138

Of the number 3,138 of the drainage of which there is no record, but little doubt can exist that the whole are drained in some way; the reasons for this belief have frequently before been given by me.

HOUSE DRAINAGE PLANS.

During the year 112 plans for the drainage of

130 houses only were made, nearly one half of which were for the drainage of new premises.

IMPROVEMENTS.

Improvements were effected by setting back the front lines of Nos. 91, 92, 101, 102, and 103, Newgate Street; Nos. 187 and 188, Fleet Street, 215, Upper Thames Street, and Nos. 87 and 88, Aldgate; the improvement at the entrance to Size Lane from Budge Row was also completed; the house No. 3, Budge Row was set back; the whole of the last-named throughfare from Walbrook to Tower Royal, has now been widened on its southern side; it was commenced in 1852, has been steadily prosecuting from time to time, as occasion offered, and is an additional illustration of the propriety of laying down an improved line, and awaiting the opportunities which in the City are sure to be afforded of carrying it out; portion of the line of improvement in Great Tower Street, east of Mark Lane, has also been completed; the fronts of Nos. 49 and 50, Watling Street, 25, Barbican, 89, Fenchurch Street, 14, Fetter Lane, and portion of the Church-yard on the northern side of Pancras Lane, have been set back, and the entrance to Plough Court, Fetter Lane, widened.

Arrangements have been completed for further improvements in front of Rutland Wharf and the

Carron Company's premises in Upper Thames Street; for further widening Newgate Street and King Edward Street; for setting back the front of three houses in Tower Street, of the house No. 3, Little Knight Rider Street, and the corner of Old Fish Street and Bread Street, and 146, Leadenhall Street.

Negotiations are proceeding for improvements by setting back Nos. 71, Watling Street, 39, Lothbury, 25, 26, and 27, Aldgate, 122, Cheapside, the north-west corner of Lawrence Lane, the frontage of a house in Primrose Street, Bishopsgate Street, the south-west angle of Maiden Lane, Queen Street, and the angle of Stoney Lane, Angel Alley.

The Ground Rents of the Commission realised by sale in the spring a sum of £10,430; during the present year, Ground Rents in Chancery Lane, Fetter Lane, Maidenhead Court, and Masons' Avenue, will be ready for disposal.

SURFACE CLEANSING AND REMOVING DUST FROM PREMISES.

The Contracts for scavenging and dusting were let, from Midsummer 1859, to Midsummer 1860, at £7,202, which was about £1,000 less than the letting of the previous year; there has been nothing in this branch of the service of the Commission which calls for special observation here.

STREET SURFACE WATERING.

The Commission have now entered upon the fourth year since they undertook the surface watering of the principal thoroughfares within the City.

The Contract for the year ending Midsummer 1860, was let at £1,244, and the work was well performed.

PAVINGS.

The only carriage-ways re-paved with new stone were, a portion of King William Street, from the bridge up to the statue; a portion of Cannon Street West, next to St. Paul's Church Yard; the Poultry, and London Street.

The principal carriage-ways re-laid were those of King William Street, from the statue to Gracechurch Street; Holborn, from Holborn Hill to the City Boundary; Ludgate Hill and Street; London Wall, from Moorgate Street to Blomfield Street; and Gresham Street, from Princes Street to King Street.

The foot-ways laid with new stone were those of Fore Street, Houndsditch, London Street, Lombard Street, and Gracechurch Street.

PUBLIC URINALS.

No additional public urinals have been erected

during the year. That in Foster Lane, against the property of the General Post Office, is not yet removed, although ordered to be so; it awaits the request of the Post Office authorities that it should be taken away. Two others also have been removed at the request of those against whose premises they were placed; one being in Freeman's Court, Lawrence Lane, and one in Star Court, Bread Street Hill: these removals are much to be regretted.

PUBLIC LAMP LIGHTING.

The triennial contracts for lighting the street lamps expired during the year; the new contracts were advertised; and the following tenders received upon the 10th of May:—

	Tendered sum per annum for batwing burners consuming 5 cubic feet of gas per hour.		
	£	s.	d.
City of London Gas Company	4	14	6
Chartered Gas Company	4	8	0
Great Central Gas Company	4	10	0

The tenders accepted were those of the Chartered Company for the northern and eastern portions of the City, and of the Great Central Gas Company for the south-western portions of the City; the contract being for the three years ending Midsummer 1862.

The same Companies have now held the contracts for public lighting for three successive triennial

periods; the cost of which has unfortunately been regularly increasing during that time, as may be seen by the following table:—

Name of Company Contracting.	Contract Price per Annum for Batswing Burner consuming 5 cubic feet of Gas per hour.		
	For 3 years ending 25 June, 1856.	For 3 years ending 25 June, 1859.	For 3 years ending 25 June, 1862.
	£ s. d.	£ s. d.	£ s. d.
Chartered Gas Company	2 19 6	4 2 0	4 8 0
Great Central Gas Company..	3 3 0	4 4 0	4 10 0

The estimated annual cost, assuming for the comparison an average number of lamps for the period, will therefore be as follows:—

Name of Company.	No. of Lamps Lighted	Price per Burner per Annum, (Tenders 1859.)	Total Cost per Annum.
		£ s. d.	£ s. d.
Chartered Gas Company .	1104	4 8 0	4,857 12 0
Great Central Gas Company	1721	4 10 0	7,744 10 0
Total.	2825	....	12,602 2 0
The total cost of lighting per annum for 3 years, ending Midsummer 1862			12,602 2 0
The cost of lighting per annum for 3 years, ending Mid- summer 1859			11,754 12 0
The cost of lighting per annum for 3 years, ending Mid- summer 1856			8,705 11 0
Present increase per annum over contract, ending 1856..			3,896 11 0

The annual cost of gas lighting has, therefore, increased 44·75 per cent. over that of the year ending Midsummer 1856.

WATER SUPPLY.

The Water Supply remains as before ; the constant supply has not yet been afforded ; the charge for supply for public purposes remains about the same as stated in my last Annual Report.

DRINKING FOUNTAINS.

The following drinking fountains have been erected in the City of London:—

Situation.	Name of Donor.
One at the corner of St. Mary le Bow Church, in Bow Lane	Messrs. Copestake and Company.
One at the corner of St. Sepul- chre's Church-yard, at the corner of Giltspur Street .	Mr. Gurney.

HOARDS AND SCAFFOLDS.

The evils alluded to in my last Annual Report of the letting out the hoards by builders and their foremen for the purpose of advertisements, appears to be upon the increase, and, if not checked, may result in the regulations of the commission, which were framed with the object of getting such projections quickly removed, being nullified ; there

will be some difficulty in preventing this; perhaps the best possible mode will be increasing the fee for hoards when licenses are applied for for long periods.

In November 1859, by the order of the Commission, a return was made by me of the whole of the struts and shores which at that time were upon the public ways of the City, from which the following appeared:—

Shores upon the public ways	70
Struts across the public ways	225
Total	<u>295</u>

Of those it appeared that—

75 were fixed during the re-building or reparation of the premises.

49 were erected by order of the district surveyors against dangerous structures.

171 were those erected either on account of the construction of sewers in the streets, and which had not since been removed, or had been put up a long time ago by the owners of the respective properties, under the apprehension of their premises being insecure.

Of the 171, some had been fixed for periods varying from one to forty years, and notices were

issued for the removal of the whole of them. Great difficulty has been experienced in getting these notices complied with; for the owners seemed in many cases to consider that long continuance had almost given a prescriptive right to their retention, and as, in some instances, their removal has necessitated the taking down and re-building of premises, and in nearly all a considerable reparation, involving questions of difficulty between owners, leaseholders, and tenants, the Commission has not pressed their immediate removal with severity.

Upon the 6th December, 1859, the following was the number remaining:—

Shores upon public ways	.....	1
Struts across public ways	.....	93
Total of both	....	<u>94</u>

There have therefore been removed since November 1858—

98½ per cent. of the shores,
 58½ per cent. of the struts,
 or 68 per cent. of the whole,
 32 per cent. remaining to be removed.

As ample time has been allowed for their removal, it is expedient that the district surveyors be at once directed to proceed against all premises dependent

for their support upon these struts, under the Dangerous Structure Clauses of the Metropolitan Buildings' Act.

DANGEROUS STRUCTURES.

The progress made in the removal of these structures may, without further remark, be gathered from the subjoined table, prepared from returns furnished to me by the district surveyors.

	1856	1857	1858	1859
Number of structures reported upon by the surveyors appointed by the Commission	286	448	268	217
Number of cases heard before the Magistrate	24	105	37	35
Number of buildings shored up during the year	150	77	37	17
Number of cases certified by the surveyors as being completed.	170	388	257	187

HOUSE INSPECTION AND REMOVAL OF NUISANCES.

The medical officer informs me that during the year 8,559 inspections of houses were made by the district inspectors, and, consequent upon their reports, the following notices have, under his direction, been issued :—

For works of drainage	3
For preventing the issue of waste water upon the surface of pavements.....	110
For lime-whiting and cleansing the interior of premises	1,186
For the prevention of the issue of opaque smoke	5
Second notices of all descriptions, the first not being complied with	225

SLAUGHTER-HOUSES.

The number of these is now 66, being two less than in the previous year. Their number is yearly diminishing.

COW-HOUSES.

The number is now 15, there having been no reduction in number since last year.

LODGING-HOUSES.

The number of houses upon the register is 125, being an increase of three upon the registration of the previous year.

SMOKE CONSUMPTION.

It has only been necessary to serve five notices

upon owners of furnaces to consume opaque smoke, —a circumstance which must be regarded as most satisfactory, considering the large number of furnaces within the City.

CHURCH-YARDS AND VAULTS.

Your medical officer has recently so fully reported upon his proceedings in relation to these, that it is only necessary to state here that the whole have been inspected by him, and that remedial measures have been adopted at his recommendation.

CITY CEMETERY.

The increased usage of the Cemetery provided by the Commission, acting as the Burial Board of the City, is so remarkable as to require special observation.

It must be recollected that the unconsecrated portion was first opened on the 24th June, 1856 ; the consecration and opening of the remainder took place upon the 16th November, 1857. Since June 1856, the interments have been as follows:—

In the year 1856	....	280 interments.	
„ 1857	....	1,378	„
„ 1858	....	2,681	„
„ 1859	....	6,181	„

Two additional stained glass windows were placed in the Episcopal Chapel, the gift of a private gentleman. The circumstances under which these were given cannot be better explained than by an extract from a Report of a Committee of the Commission which was made upon the 24th of October last, which is as follows:—

“ It will be in the recollection of the Board that application was, two years ago, made for permission to erect a painted-glass window in the central compartment, behind the reading desk, in the Episcopal Chapel; that application was acceded to, and last year, after our inspection of the cemetery, your chairman reported to you verbally that a very handsome work of art had been placed there, and that it was the gift of Mr. Alderman Wilson.

“ Shortly afterwards, application was made through your surveyor, by a gentleman who was desirous of erecting two memorial windows of stained and painted glass, which likewise with your permission have since been put up; one being on either side of the first that was erected. It was understood that the donor was desirous that his name should not be mentioned, which request the Board had every desire to respect. The difficulty of maintaining such secrecy is however, obvious, and through various circumstances his name has become known to many members of the Board as

well as to other persons; and this being the case, we think we may be excused by the donor if we inform you that it is also Mr. Alderman Wilson to whose generosity they are due,—knowing, moreover, that your Board would be desirous of suitably acknowledging a liberality which has so appropriately embellished and increased the solemnity of the principal building upon the cemetery.”

The Committee were also able to report the fact that a sum of money, after paying all expenses, was placed to the account for defraying the first cost of the Cemetery, and that there were good grounds for believing that in the ensuing year that sum would be very largely increased.

MISCELLANEOUS.

The Commission, in addition to the transaction of the foregoing business, was much occupied with other matters not strictly coming under any special head, but which, nevertheless, were of considerable importance.

Among the most prominent was their opposition to the Bill of the City of London Gas-light Company, who applied to Parliament for fresh powers. By their original Act, the Company was incorporated to a period which expires on the 23rd May, 1863, and fresh power of incorporation was sought,

and also power to continue to manufacture gas in perpetuity at their premises in Whitefriars. The Commission, whose attention had for years been drawn to these works by complaints of nuisance arising from them, opposed the continuance of the manufacturing process within the City, believing that no difficulty would arise, and no hardship accrue, if the Company was compelled to manufacture at some distance from the Metropolis, using a portion of their present site for storage, and their distributory system remaining the same.

The bill was opposed in the Committees of the Houses of Lords and Commons, but passed through both. The defeat of the Commission is a matter of much metropolitan importance, as the perpetuation of the power to manufacture conferred upon this Company must destroy all hope of the manufacture of gas being removed from the centre to the outskirts of the metropolis for a very long period.

Another case of very great importance to the Commission, and, indeed, to all the Paving Boards of the Metropolis, was the action of *Newbold v. Daw*; the facts of which were simply these:—

One dark, foggy night (the 25th February, 1857), the plaintiff, crossing the carriage-way of Eldon Street, slipped when placing his foot upon the kerb of the foot-way on the southern side of the way, and fell, breaking his leg in the fall. Many months

afterwards he applied for compensation, alleging the pavement to have been in a defective state. This was referred to your Engineer to report upon, who did so on the 27th October in the same year, informing the Commission that the kerb, although slightly worn, was not by any means dangerous. The Commission, therefore, refused compensation, and, upon another subsequent application, were threatened with an action. A committee then inspected the place, and unanimously concurred in the correctness of the report of the Engineer, and compensation was therefore again refused.

The action was then brought. The Commission decided to resist it; and as it was a case of vital importance to them as conservators of public funds likely to be much drawn upon, if by the verdict they were found liable to compensate in this case, they obtained the moving of the cause to a higher tribunal than that in which the action was originally brought.

Many months passing away, and the case not being further prosecuted by the claimant, the Engineer reported on the 18th January, 1859, that as the stone upon which the plaintiff slipped was by the lapse of time wearing away, and it was essential that the jury should view it before the condition of the stone was materially altered; the Commission took measures to have the action either relinquished or pressed to a verdict; it was

accordingly heard in the Court of Queen's Bench, on the 7th December, 1859, and a verdict for the Commission obtained.

Permission having been given for the erection of street indicators, the first of them was placed up in August 1859, in the centre of Holborn, west of the public urinal at that spot. Later in the year one was fixed in the centre of Exchange Buildings, at the south-east angle of the Royal Exchange; but upon great objection to it being made by the inhabitants, it was removed.

Street tablets, the invention of Mr. Davis, the name being painted upon glass, and the back filled in with a composition, were brought under the notice of the Commission; their principal recommendation being that they were about 50 per cent. cheaper than others hitherto used: some of them are ordered to be fixed experimentally.

The question of the projection of stone and brick buildings upon the public ways was reported upon, and regulations are now under consideration.

In the beginning of the year a Company termed the Omnibus Sub-way Company, gave notice of their intention to apply for powers to construct a sub-way from the Royal Exchange to the Houses

of Parliament, and along it to draw carriages by ropes and stationary engines. This scheme, which proposed to excavate the whole line of main thoroughfare between the Royal Exchange, Charing Cross, and the Houses of Parliament, and which, startling at first sight, appeared upon examination to be well worthy of close attention, was dropped by the promoters.

I have the honor to remain,

GENTLEMEN,

Your most obedient Servant,

WILLIAM HAYWOOD,

Engineer and Surveyor.

CITY OF LONDON SEWERS.

DUTY OF THE INSPECTOR OF SEWERS.

The duties of the Inspector of Sewers are entirely in the department of the Engineer and Surveyor, under whose direction he is exclusively to act, and to whose instructions he is in all things strictly to attend.

Generally he has charge of the reparation, ^{General} jobbing works, and cleansing of the sewers, gullies, ventilators, and other appliances within the City; also the construction, maintenance of such portion of the house drains as lie beneath the public ways, and has to act therein in accordance with the various rules of the Commission, and as he may be directed by the Engineer.

He is to reside either within the City or at ^{Residence} a short distance only from the City.

Daily attendance.

To attend at the office of the Engineer once every day, or as he may be from time to time directed: and also at the Sewers' office once daily, and insert his name in the book kept for that purpose; extract from the book all complaints which lie in his department, and have the same attended to forthwith.

Absence.

He is not to absent himself from his duties without the sanction of the Engineer, and when unable to attend through illness, immediately to communicate the circumstance to him.

Examination of Sewers.

To make such personal examinations of the Sewers, and take such measurements, levels, and sketches as he may be directed by the Engineer, and prepare the information required by him for recording the Sewers.

Reparation and Cleansing.

To direct for all works of reparation and alteration, and personally superintend the works: give the directions for the flushing and cleansing, and be responsible that the same be properly carried out.

Private Drains.

To measure and superintend the construction of private drains beneath the public way, and check the accounts for the same, and

3

deliver them to the Engineer for examination.

Superintend any gaugings which may be directed, and work out the same. Gaugings.

To register the various meteorological instruments kept in the Engineer's department. Meteorological Instruments.

To examine and check all vouchers delivered for work, enter them in the books kept for that purpose ; check the bills for the same in respect of quantities, and deliver them to the Engineer. Vouchers and Bills.

The occupation of the Inspector will vary from 8 to 10 clear hours daily ; but it is to be understood that no fixed hours can be assigned to him for the duration of his work, but that he must be out early and late when required to superintend flushing or gauging, or any business which in the opinion of the Engineer may need his attendance. Time occupied.

5 36

REPORT

TO THE

HON. THE COMMITTEE UPON IMPROVEMENTS

OF THE

COMMISSIONERS OF SEWERS

OF THE

CITY OF LONDON

UPON THE

RAILWAY

AND OTHER COMPANIES, APPLYING FOR POWERS TO CON-
STRUCT WORKS WITHIN THE CITY OF LONDON.

BY

WILLIAM HAYWOOD. M. INST. C.E., F.R.I.B.A.

ENGINEER AND SURVEYOR TO THE COMMISSIONERS.

21st January, 1861.

LONDON:

PRINTED BY M. LOWNDS, 148 $\frac{1}{2}$, FENCHURCH STREET. E. C.

1861.

*At a Meeting of the Improvement Committee
of the Commissioners of Sewers of the City
of London, at the Guildhall, on Monday,
January 28th, 1861.*

The Report of the Surveyor, hereunto annexed,
being read,

IT WAS ORDERED—

That the same be Printed, and a copy be sent
to every Member of the Court.

JOSEPH DAW,

Principal Clerk.

REPORT

UPON THE

RAILWAY AND OTHER COMPANIES, APPLYING
FOR POWERS TO CONSTRUCT WORKS

WITHIN THE

CITY OF LONDON.

TO THE HONORABLE THE COMMITTEE UPON IMPROVE-
MENTS OF THE COMMISSIONERS OF SEWERS OF
THE CITY OF LONDON.

SEWERS' OFFICE, GUILDHALL,
21st January, 1861.

GENTLEMEN,

I beg to report that I have made general examination of the Plans of the various Railway, and other Companies who seek powers during the ensuing Session of Parliament, to enter, and execute works, within the City of London.

The projects are as follows:—

1. The Metropolitan Railway, extension to Finsbury Circus.
2. The Finsbury Circus Railway Station with approaches.
3. The Eastern Counties and Finsbury Railway.

4. The Metropolitan Railway Improvements.
5. The East London Railway.
6. The North London (Branch to City) Railway.
7. The West End and City Railway.
8. The Charing Cross Railway, City Terminus.
9. The Thames Embankment.
10. The Concentration of Courts of Justice (acquisition of site.)

It is to be understood in the following remarks, that where areas are given, and public ways numbered, they refer (with the sole exception of the Court of Justice Plans) only to those which are within the jurisdiction of the Commission.

THE METROPOLITAN RAILWAY—EXTENSION TO FINSBURY CIRCUS.

During the last session of Parliament, the Metropolitan Railway Company, were authorized to construct a railway from Paddington to the proposed Smithfield meat market; the present project is for extending that railway from the market, to Finsbury Circus.

After leaving the proposed market, the line proceeds at the back of the property on the northern side of Long Lane, crossing beneath Charterhouse Street, and Aldersgate Street, at about seventy feet north of Barbican; thence inclining to the south-east, it passes Steer's Court, Figtree Court, Jacob's Well Passage and Redcross Street close to Paul's

Alley, Bowling Square and Whitecross Street, King's Head Court and Square, Milton Street, Moor's Square and Moor Lane, it then runs eastward at the back of the property on the northern side of Fore Street, through Ebenezer Place and Half-moon Alley to Little Moorfields, which it crosses a few feet from Green Arbour Court, and thence to the west side of Finsbury Pavement about 120 feet north of London Wall, at which point the line terminates.

The property scheduled for the purposes of this railway, has between Smithfield and Milton Street, an average width of about 100 feet, and includes nearly the whole of the houses on the northern side of Long Lane ; between Milton Street and Finsbury Pavement, the property scheduled is bounded on the north by Carr Square (the whole of the property in which is included) and new Union Street, the whole of the southern side of which is also included, on the east by Little Moorfields and part of Finsbury Pavement, on the south by Fore Street for a length of 300 feet, measuring from Finsbury Pavement, and thence by a line which is at the back of the houses in Fore Street, and terminates in Milton Street near to Honeysuckle Court.

The total area scheduled is about *fourteen acres* which includes the portions of all the public ways within the limits of deviation.

The number of public places of all denominations,

to be passed under, stopped up, appropriated or interfered with is *forty*.

The railway is proposed to be in a *tunnel* throughout its entire length; the levels of the public ways not appropriated will be unaltered, with the exception of Moor Lane, which is at one point to be raised about 2 feet 6 inches above the present level.

THE FINSBURY CIRCUS RAILWAY STATION, WITH APPROACHES.

This scheme is designed in connection with the Metropolitan Railway Extension before described, and with the Eastern Counties and Finsbury Railway, a description of which will follow. It will provide the station accommodation for both of those railways, and form the connecting line between them, taking up the one at Moor Lane, and the other at Blomfield Street.

Of the property scheduled, the northern limit begins at the north-west angle of New Union Street, runs the whole length of that street on its southern side, crosses Finsbury Pavement, then runs up the east side of Finsbury Pavement to South Place, and thence along the whole length of South Place, Eldon Street, and Broad Street Buildings; the eastern limits extend along the western side of Broad Street Buildings and New Broad Street, to within a few feet of London Wall;

the southern boundary runs at the back of London Wall from New Broad Street to Blomfield Street, thence on the northern side of, and along the whole of London Wall to Finsbury Pavement, and along the northern side of Fore Street as far as to Moor Lane; the western boundary is the eastern side of Moor Lane, between Fore Street and New Union Street.

The area scheduled for this station and railways is about *twenty and a quarter acres*.

The public ways interfered with are *twenty* in number.

The Approaches comprehend a new street sixty feet wide, and perfectly straight, from the northern end of Bartholomew Lane to London Wall, and a cross street fifty feet wide, leading out of it from its western side, and running into Moorgate Street near to Great Swan Alley.

The plan of the property scheduled for the approaches is irregular in outline, and comprises much of the poor property in the intricate series of courts and alleys which form the neighbourhood lying between London Wall, the Drapers' Gardens, and the backs of the houses in Moorgate Street, the total area including public ways is *four acres and three quarters*.

The public ways to be absorbed, cut through, or altered in some way for the formation of these streets are *fourteen* in number.

In the station and approaches together, there is, therefore, an area of about *twenty-five* acres scheduled, and *thirty-four* public ways to be interfered with.

THE EASTERN COUNTIES AND FINSBURY RAILWAY.

This railway is proposed to branch out from the Eastern Counties Railway at Arundel Street, in the Parish of Bethnal Green, and proceed, crossing Brick Lane, Quaker Street, New Commercial Street, White Lion Street, and entering the City by crossing beneath Bishopsgate Street at its junction with Norton Folgate; thence crossing Primrose Street, Skinner Street, Acorn Street, Angel Alley, Sun Buildings, Sun Street, Dunning's Alley, Sweet Apple Court, Half-moon Street, and One Swan Yard, it turns across Baker's Buildings, and joins on to the Metropolitan Railway at the Circus Station at New Broad Street, at the point before described.

Improved approaches are included in this project. One is a street fifty feet wide, which leaves Liverpool Street, near to Baker's Buildings, and proceeds northwards to the elbow in Broad Street Buildings, and from that point it appears to be projected, to widen Broad Street Buildings to a width of sixty feet the whole length to Bloomfield Street.

The property sheduled for this scheme is about 200 feet in width on the whole line from Bishops-gate Street to Liverpool Street, it then becomes irregular in outline, and not capable of being easily understood if described without the aid of a map, but it includes nearly the whole of the property between Broad Street Buildings, Blomfield Street, London Wall, and the northern portion of Broad Street. The total area, including that of the public ways, is about *eleven and a half acres*.

The number of public ways stopped up, appropriated, or interfered with is *twenty-nine*.

The line is to be in a *tunnel* throughout.

THE METROPOLITAN RAILWAY IMPROVEMENTS.

By this bill it is proposed to give the Metropolitan Railway Company, power to take additional lands, to widen portions of the line, and make other arrangements for the improvement of the line generally; and also to run a loop line to Smithfield Meat Market, but by none of these is the City interfered with, excepting by the last mentioned.

The loop leaves the main line in Victoria Street, and proceeds by a curve to the back of West Street, thence crossing Durham Yard, it enters the area of the new market authorised during the last session of Parliament.

It is to be in a *tunnel* throughout the whole of its line.

The area of the property sheduled is about *three and a quarter acres*.

The number of public ways interfered with *five*.

THE EAST LONDON RAILWAY.

This is a project for making a Railway from New Broad Street to the River Thames, at a point close to the Irongate Wharf, including also various branches.

It commences at New Broad Street, at which point it joins on to the proposed Eastern Counties and Finsbury Extension Railway; from thence it is to be carried at the backs of the houses and property on the south side of Liverpool Street, and across Bishopsgate Street into Houndsditch, down the centre of that street into the Minories, keeping at the northern portion beneath the public way, but at Swan Street striking off slightly to the east, and going beneath the Blackwall Railway, across Royal Mint Street, King Street, and Little Tower Hill, to the St. Katherine's Dock warehouses, (the whole length of one large stack of which it traverses,) and terminates on the property of the Dock Company, close to St. Katherine Street, about 150 feet from the Irongate Stairs, and the eastern entrance to the Tower of London.

From this trunk three branches are proposed.

The first Branch leaves the line at High Street, Aldgate, and passes with a curve beneath the houses at the north-east angle of the Minories, Golden Fleece Court, and Chequers' Yard, to the goods depôt of the London and North-western Railway Company in Haydon Square.

The second Branch leaves the main line at Haydon Street, Minories, and passing with a curve beneath Swan Street, and Goodman's Yard, terminates at the goods depot of the Great Northern Railway on the south side of the Blackwall Railway.

The third Branch leaves the line by Swan Street, Minories, passing by a curve to the new warehouses in Royal Mint Street, belonging to the Victoria (London) Dock Company.

The whole of these lines are to be in *tunnels*, the surfaces of the various public ways traversed, being apparently unaltered.

The area scheduled comprises Broad Street Mews and much property adjacent, the whole of the property on the south side of Liverpool Street, from New Broad Street to Bishopsgate Street, and that in New Broad Street Court, and White Hart Court, the property on either side of Houndsditch throughout its entire length, the whole of that on the eastern side of the Minories, and all that also which is bounded by Royal Mint Street, Queen Street, and Little Tower Hill. There is also a small quantity of property upon each side of the three branches.

The area, including the public ways, is about *ten acres and three quarters*.

Thirty-seven public places are interfered with.

THE NORTH LONDON RAILWAY—(BRANCH TO CITY.)

This is a project for constructing a railway from Liverpool Street in the City of London, to the North London Railway at Kingsland.

The junctions with the North London Railway are to be made not far from Dalston Lane, and be carried east of the Kingsland Road, but almost parallel with it until near to Leman Street, when it crosses to the western side, goes over Old Street Road, and continuing west of High Street, Shoreditch, enters the City at Primrose Street, Bishopsgate Street, towards its eastern extremity; it then crosses Skinner Street, Sun Street, Foster Street, Half-moon Street, and Broad Street Buildings, to its terminus on the northern side of Liverpool Street.

The property scheduled within the City is about 120 feet in width from Primrose Street to Sun Street. A large space is there included, which is bounded on its south side by the street line, on the north side of Liverpool Street, from Broad Street Buildings to Blomfield Street; thence to Eldon

Street, and up the north side of Eldon Street to Long Alley; on the eastern side by the whole length of Long Alley, from Eldon Street to Sun Street, then along the south line of frontage of Sun Street to Peter's Street, and thence in an almost straight line down Peter's Street to Broad Street Buildings.

The total area scheduled within the City is about *five acres*.

The total number of public ways to be interfered with is *eleven*.

Its entire length within the City is to be carried on a *viaduct*. All public ways in the scheduled area between Liverpool Street, and Sun Street, are to be stopped up and appropriated; Sun Street, Skinner Street, and Primrose Street, are to be spanned by arches fifteen feet high.

THE WEST END AND CITY RAILWAY.

This railway is proposed to commence at Regent Circus, Piccadilly, and terminate at the proposed Smithfield Market, in the City.

After leaving the Circus, it proceeds by Coventry Street, Leicester Square, Cranbourn Street, Long Acre, and Great Queen Street, keeping entirely in the line of public way; at Great Queen Street it passes beneath property, and crosses beneath the public ways of Little Queen Street, Gate Street,

&c., to Holborn, thence continuing along the line of public way, it enters the City at Holborn Bars (avoiding Middle Row), and proceeds along Holborn to Leather Lane, thence turning slightly northward, it goes beneath private property, passing under Hatton Garden, Ely Place, over Victoria Street, and thence south of West Street to the proposed New Meat Market.

Between Regent Circus and Union Court, Holborn, this railway will be in a *tunnel*, none of the public ways enumerated being altered in level until it arrives at Union Court, Holborn, the surface of which will be *raised eight feet*, and the railway will still pass beneath it; towards Field Lane the *tunnel* will terminate, and the railway will be carried over Field Lane and Victoria street by a *viaduct*; the latter thoroughfare will be spanned by a girder bridge fifty-five feet wide, and fifteen feet clear height, it will then go *over* Fox and Knot Court, the level of which is to be *lowered* nine feet, and *beneath* John's Court, the surface of which is to be *raised* twelve feet, and thence in a tunnel to the market.

Very little property is scheduled for the railway; the area in the City, including that of the public ways is about *four acres*.

The total number of public places interfered with is *seven*.

THE CHARING CROSS RAILWAY (CITY TERMINUS.)

This is a project for making a junction with the Charing Cross Railway, near to Redcross Street, in the parish of St. Saviour Southwark; thence crossing the River Thames near to the Steel Yard in Upper Thames Street, and terminating at Cannon Street, close by Turnwheel Lane in the City of London. Its length within the City will be upon a *viaduct*; the level of the rails at the City terminus will be very nearly the same as the carriage-way of Cannon Street.

The area scheduled is *four and a half acres*; the number of public ways to be interfered with is *nine*.

THE THAMES EMBANKMENT.

This is a plan for embanking the Thames on the Middlesex side of the river, between Westminster and Blackfriars Bridges; and is designed to fulfil three important objects.

Firstly. To serve as a line of public highway between the points named.

Secondly. To enable a railway to be constructed upon its line, terminating by a junction with the London, Chatham, and Dover Railway, at or near to New Bridge Street.

Thirdly. To serve as a line for constructing the

low level intercepting sewer, now projected to be carried along the Strand and Fleet Street.

The embankment, with its road and railway, commences at the eastern side of Westminster Bridge, and is carried until within a short distance of Blackfriars Bridge, entirely in the bed of the river. The roadway is proposed to be next to the river, the railway nearest to the existing wharves; at Blackfriars Bridge the roadway terminates by a junction with Chatham Place: whilst the railway, proceeding over Chatham Place, joins the London Dover and Chatham Railway Extension, authorised last session of parliament, and now in the course of construction.

The area scheduled within the city is *two acres and three quarters*; there are also about *thirteen acres of river shore* fronting the city line of wharfage, which are scheduled.

The number of public ways to be interfered with is *fourteen*.

CONCENTRATION OF COURTS OF JUSTICE. (ACQUISITION OF SITE.)

The title of this Bill bespeaks the nature of the work intended to be performed. The deposited plans show that a large quantity of property is to be removed; it is bounded by the north side of Carey Street and Yates' Court; east, by Bell Yard, Fleet Street; south, by Fleet Street and the Strand, from Bell Yard to Clements' Lane; and

west, by a line running from the last named point to Horse Shoe Court, Clements' Lane.

The total area, including public ways, is about *sixteen acres*, of which four or five houses only are within the city; *the Temple Bar* itself is scheduled: the area of property taken in the city is but about *300 yards superficial*. Shire Lane is it seems to be destroyed as a thoroughfare.

In my report to you last year, upon the various railway bills then applied for, which affected the City of London, it was stated, that since the year 1846, when as many as nine different railway companies gave notice of their intentions to apply for powers to enter the city, and an area of 100 acres was scheduled; so great a demolition of property and appropriation of public ways had not been contemplated: the area scheduled last year being *fifty-three acres*; the number of public ways to be stopped up, or interfered with, being *one hundred and twelve*.

This year the magnitude and variety of the projects nearly approaches that of the year 1846, for the number of schemes is ten, and the total area scheduled is *eighty-four acres*; the *thirteen acres* of river bed not being included therein. In some cases, however, owing to the different companies approaching the same points, the same properties are scheduled under different bills; making

allowance for this, the area scheduled is *seventy-two and a half acres*, of which *twenty acres are public way*; and the area of the property threatened with demolition is about *fifty-two and a half acres*. The number of public ways to be appropriated, stopped up, altered or interfered with, is about *one hundred and sixty*.

It is a matter to be noted that, with the exception of the North London Railway Branch, and the Charing Cross Railway City Terminus Branch, the whole of the projected lines are to be in *tunnels*: following thus the example of the Metropolitan Railway, the propriety of making which a subterranean structure, was so long a debated question.

Further detail, such as the position of stations, mode of working, and other points of importance, I am unable yet to inform you of; and the magnitude of the schemes (an outlay of several millions of pounds sterling is contemplated), and the limited time which has elapsed since the plans were deposited, precludes the possibility of such an investigation of them, as might enable me to enter upon the question of their relative merits, but a glance at the map which I lay before you, and a brief reference to the list of railways either already authorised, or in course of construction, or actually working within the Metropolitan boundary, will show that the whole are worthy of the closest consideration, and that the importance of some, it is almost impossible to over-rate.

The salient and most important feature (one indeed, which if realised, may be expected materially to influence the future distribution of metropolitan traffic) is the convergence of the whole of the schemes to the commercial centre; the extension of the Metropolitan and Eastern Counties Railway to Finsbury Circus, (conveying, as they certainly in time will, the traffic from so many tributary lines,) and the placing of the City terminus of the Charing Cross Railway in Cannon Street, and that of the North London Railway in Broad Street, will enable a large portion of the metropolitan population as well as those from the country to enter, and leave the City, or pass through it to either of the suburbs, with a certainty as to time, and comfort, to which they have long been unaccustomed; and perform journeys speedily which the present state of the main thoroughfares is daily making more difficult and vexatious.

Another important feature is the projected construction of *approaches*, having for their object direct means of access to the various termini and the relief of main thoroughfares adjacent, in one of those now designed, the collateral effect of opening out a poor district, will be to make that truly valuable, which at present is comparatively valueless.

On the advantage of a Thames embankment having a railway throughout its length, and a road-

way for traffic of all classes eighty feet in width, it is needless to dilate. For full *thirty* years this project has been before the public, and although most men of engineering eminence, have agreed in the expediency of its execution, yet hitherto the want of funds, together with local trade opposition, have been sufficient to prevent its realization, and, if it should be shortly carried out, it will owe that completion, as much to the fact of its affording means of obviating the public inconvenience, which the construction of the Northern Low Level Intercepting Sewer will otherwise cause the public, as to any other advantage inherent in the embankment scheme itself.

The demolition of property for the new Courts of Justice, will afford means of widening Fleet Street in the immediate vicinity of Temple Bar; but the southern is the most favourable side, for effecting a really good street improvement in that locality. The south side will not be touched by the Courts of Justice scheme.

By nearly the whole of the projects, public thoroughfares of importance will be interfered with. The construction of some of the railways will necessitate the occupation of large streets for some months, and excavation throughout their entire length; other streets will apparently disappear altogether from the City map, giving place to the structures erected for railway purposes, or to new

buildings for the general purposes of commerce which will replace them; and it is scarcely too much to say, that the existing plan of sewerage of a considerable portion of the City must be destroyed, and miles of sewers be reconstructed.

As in previous instances also, all the companies appear to contemplate the absorption of large areas of public way, for their own advantage.

The arrangement for reconstructing, and leaving the sewerage in its integrity, without charge to the ratepayers; for guarding the public ways from unnecessary encroachment, for protecting neighbourhoods, and the public, as far as possible, from injury; are matters which can only be dealt with at a future day, and after much further investigation; and although I desire nothing less than to seem to oppose projects, fraught as I believe most of them to be, with great metropolitan benefit; it seems at present needful that the Commission should dissent from the whole, so as to obtain the *locus standi* for negotiation, or opposition, should that ultimately be found requisite.

I have the honor to remain,

GENTLEMEN,

Your most obedient Servant,

WILLIAM HAYWOOD,

Engineer and Surveyor.

REPORT

OF THE

WORKS EXECUTED

BY THE

HON. THE COMMISSIONERS OF SEWERS

OF THE

CITY OF LONDON,

DURING THE YEAR 1860.

BY

WILLIAM HAYWOOD. M. INST. C.E., F.R.I.B.A.

ENGINEER AND SURVEYOR TO THE COMMISSION.

5th March, 1861.

LONDON:

PRINTED BY M. LOWNDS, 148 $\frac{1}{2}$, FENCHURCH STREET. E. C.

1861.

*At a Meeting of the Commissioners of
Sewers of the City of London, held
at the Guildhall of the said City, on
Tuesday, 5th March, 1861:—*

The Engineer and Surveyor laid before the Court
a Report as under.

ORDERED—

That the same be printed, and a copy sent to
every Member of this Court, and of the Court of
Common Council.

JOSEPH DAW,
Principal Clerk.

REPORT

OF THE

WORKS EXECUTED BY THE HONORABLE
THE COMMISSIONERS OF SEWERS

OF THE

CITY OF LONDON,

DURING THE YEAR 1860.

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REPORT

OF THE

WORKS EXECUTED BY THE HONORABLE
THE COMMISSIONERS OF SEWERS

OF THE

CITY OF LONDON,

DURING THE YEAR 1860.

TO THE HONORABLE THE COMMISSIONERS OF
SEWERS OF THE CITY OF LONDON.

SEWERS' OFFICE, GUILDHALL,
5th March, 1861.

GENTLEMEN,

I beg to lay before you my Report upon the works you have executed, and upon your transactions generally during the year 1860.

SEWERS.

The total length of new sewers built was 1,875 feet, of which 1,703 feet were reconstructed upon the lines of old sewers.

The experiment of applying charcoal to the

sewer ventilators, so as to destroy offensive emanations, was commenced: a district of the City in which the sewers are considered to be the most offensive was selected for the purpose, the experiment has been in operation since the month of July; but the exceptional character of the weather during the year prevented that experience being obtained which is desirable: the results during the present year will be made the subject of a Special Report by Dr. Letheby and myself.

An experiment was also made upon the sewage, by applying MacDougall's deodorizing fluid; the result of which will also be made the subject of a Special Report.

HOUSE DRAINAGE.

The total number of premises drained during the year 1860, was	178
The approximate number of premises known to be drained at the end of the year 1859, was	12,862
The total number of houses of which some record is now possessed as to their being drained, is about	13,040
The approximate number of premises about the drainage of which nothing is known, and which have hitherto been set down as undrained is about	2,960

Of the number 2,960 of the drainage of which there is no record, but little doubt can exist that the whole are drained in some way; the reasons for this belief have frequently before been given by me.

HOUSE DRAINAGE PLANS.

During the year 153 plans for the drainage of 178 houses were made, nearly one half of which were for the drainage of new premises.

The Commission now possess plans of the drainage of all houses drained since the middle of the year 1851.

IMPROVEMENTS.

Improvements were effected by setting back the front lines of Rutland Wharf and the Carron Company's premises in Upper Thames Street, and of the warehouse next adjoining (eastward) to the Coal Exchange in Lower Thames Street; the angle of the house at the corner of Bread Street and Old Fish Street, and that at the south-east angle of Lawrence Lane and Cheapside; the fronts of Nos. 62, 63, and 64, Great Tower Street, 146, Leadenhall Street, 159, Bishopsgate Street, 25, 26, and 27, Aldgate, and 139, Lothbury, and 71, Watling Street.

Arrangements have been completed for further improvements by widening Newgate Street, eastward of King Edward Street, and also for widening the southern end of King Edward Street, setting back the fronts of 3, Little Knight Rider Street, 71, Watling Street, and four houses on the east side of Little Trinity Lane.

Negotiations are pending for setting back the frontages of 70, Watling Street, 189, Fleet Street, 76, 77, Newgate Street, 69A, Leadenhall Street, 60, Great Tower Street, 20, Little Trinity Lane, also property on the north side of Old Broad Street; the north corner of Little Knight Rider Street and Godliman Street, and the corner of Stoney Lane and Angel Court.

Certain Ground Rents belonging to the Commission were sold in the spring of the year, and realized a sum of £8,554; other Ground Rents will be ready for sale during the present year.

SURFACE CLEANSING AND REMOVING DUST FROM PREMISES.

The Contracts for scavenging and dusting were let, from Midsummer 1860 to Midsummer 1861, at £8,779, which was £1,577 more than the letting of the previous year.

The degree of efficiency maintained during the year varied considerably in the different districts;

in some the work was exceedingly well attended to, in others much neglected by the Contractors, who were only kept to the discharge of their duty by much trouble and repeated fines.

STREET SURFACE WATERING.

The Commission have now entered upon the fifth year since they undertook the surface watering of the principal thoroughfares within the City.

The contracts for the year ending Midsummer 1861, were let at £1,263, which was but £19 more than the previous letting, although the area included in the last contract was increased considerably over that of the previous year.

The work was well performed when it was required; but throughout the largest portion of the year the pavements were sufficiently moist without the aid of the water carts.

PAVEMENTS.

The only carriage-way paved with new granite was that of Fleet Street.

Those of Lombard Street and Mincing Lane were paved with new wood.

The wood pavement removed from Mincing Lane was probably the oldest then existing in the Metropolis. It was laid new by Mr. Carey in the year 1841,

and had consequently been down nineteen years ; once during that period it was turned and re-laid, and once re-laid, the tops of the blocks being cut off, and it was at other times extensively repaired : there is no instance I believe in this country of such a duration in a wood pavement in a public thoroughfare.

The only carriage-ways of importance re-laid throughout their entire length were those of Newgate Street, King William Street, and Wormwood Street, a few other Main Streets were partially re-laid, and some other places of minor importance.

The reason why few extensive works of paving were executed was mainly attributable to the incessant rain which characterized the year. Almost the only consecutive fine weather was towards the end of the month of April and the beginning of May, when, fortunately the carriage-way of Fleet Street was renewed, with the exception of a portion of one day throughout the whole of that work, the weather was fine and dry, and the work was done in an unprecedentedly short time, and in an admirable manner.

When other carriage-way pavings were commenced, the rain commenced almost simultaneously with them. During the time those of King William Street and Newgate Street were being re-laid, it rained at least every other day, and the substrata

were never entirely dry during the whole of the work ; under such circumstances it is surprising the pavements look so well as they do.

Out of the 366 days of the year 1860, the register kept by me at Guildhall, shows 192 days upon which rain fell.

This delay in the execution of paving works will necessitate the performance of much work during the present year,—a matter to be regretted, for as it rarely happens that more than one important street can be closed at the same time, it is often difficult enough to find fair weather and suitable periods for performing within one year that which is fairly incidental to it.

A specimen of composite pavement, the patent of Sir John Scott Lillie, Bart., of which the component parts are asphalte, wood, and broken granite, was laid at the eastern end of Lombard Street, adjoining the new wooden pavement laid at the same time ; the comparative durabilities of the two sorts of pavement will, therefore, be tested.

In December, 1859, I reported at length upon the subject of Mr. J. B. Redman's cast iron tramways. A trial was directed, and in the month of May a considerable length was laid by the patentee at the eastern end of Leadenhall Street, and the western end of Fenchurch Street. Up to the present time the tramways have well answered their purpose, but longer experience in their usage

is needful before a mature opinion can be given upon their degree of success.

PUBLIC URINALS.

No additional public urinals were erected during the year. One in Foster Lane was removed.

The list of those now existing, which were erected by, and are under the special control and management of, the Commission, is given in the Appendix. The total number is 29, and the total number of persons which can be accommodated at the same time is 69.

The amount of public accommodation of this character is less than it was a few years since; for, owing to objections raised by inhabitants and owners of property, several have been removed within the last few years. Indeed, experience leads to the conclusion, that if this species of accommodation is to be extended it should be in the centre of great thoroughfares, for the expense of their construction, maintenance, and water supply is very considerable.

PUBLIC LAMP LIGHTING.

The contracts for lighting the public lamps were let in the year 1859. Nothing of importance occurred during 1860, which deserves special men-

tion, excepting that account of all public lamps not lighted or extinguished, or imperfectly lighted, were, and are now, regularly reported by the Commissioner of the City Police; and that during the year the light of 266 lamps was reported by him to have been defective.

The majority of those complaints extended to deficiency in light for periods not exceeding one night, and at the outside the complaints cannot, I think, prove more than a deficiency in the light of one lamp per night throughout the year, which, considering there are 2,830 lamps within the city, is a per centage of defect of a trifling nature.

WATER SUPPLY.

The water supply to the city remains as before. The constant supply has not been attempted in any portion of the metropolis.

The Commission now pays a considerable sum annually to the Water Companies for the supply for public purposes; the charges of the New River Company, during the year 1860, were—

For supply to Urinals	£312	9	3
For Flushing Sewers	18	1	3
For Washing Courts	91	7	0
Total	£421	17	6

DRINKING FOUNTAINS.

Three additional drinking fountains were erected within the City ; their situations are as follows:—

Situation.	Name of Donor.
One at Fleet Street, in front of the Church of St. Dun- stan's in the West	Sir James Duke, Bart., M.P., Al- derman, &c.
One at Adelaide Place, Lon- don Bridge	The United King- dom Temperance, and General Provi- dent Institution.
One in Bishopsgate Street, Without, in front of the Church of St. Botolph, Bishopsgate	C. Gilpin, Esq., M.P.

There are now five drinking fountains within the City of London.

The fountain which was proposed to be erected in front of the portico of the Royal Exchange, and for which permission was given some time ago, has not yet been placed there.

Probably there are few sites in London where a fountain can be more advantageously placed for utility, and there is none which demands a handsomer structure. One placed there should be a work of art, and be liberally endowed for the pro-

vision of an ample supply of water. If a fountain in every respect worthy of the situation was placed there under the care of the Corporation, it might stand for centuries as a monument of the taste and generosity of its donor, and an enduring record of his name.

HOARDS AND SCAFFOLDS.

In November 1858, a return was made of all shores and struts then existing upon and over the public way, many of which had remained for many years. Measures were taken for their removal, which, from various reasons, could not be accomplished so readily as might have been expected. At the end of 1859, 32 per cent. of the whole still remained.

At the present time, those remaining are as follows:—

Shores upon public ways		0
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Struts across public ways		82
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About 27 per cent. therefore remain to be removed; but for the retention of some of these the Commission has granted permission under special circumstances.

DANGEROUS STRUCTURES.

The business transacted by the Commission under the Metropolitan Buildings' Act may be gathered from the following summary of cases:—

Number of structures reported upon by the Surveyors appointed by the Commission ..	286
Number of cases heard before the Magistrate .	24
Number of buildings shored up during the year	150
Number of cases certified by the Surveyors as being completed	170

HOUSE INSPECTION AND REMOVAL OF NUISANCES.

From the return prepared by your Principal Clerk it appears that during the year, 8,824 inspections of houses were made by the district inspectors under the direction of your Medical Officer of Health, and, consequent upon their reports, the following notices were issued:—

For works of drainage	19
For preventing the issue of waste water upon the surface of pavements	64
For lime-whiting and cleansing the interior of premises	1,093
Total.....	<u>1,176</u>

SLAUGHTER-HOUSES.

The number of slaughter-houses is now 66, being the same as at the end of 1859. Amended rules and regulations were issued early in the year.

COW-HOUSES.

The number of cow-houses is now 20, being 5 more than at the time of my last Report.

LODGING-HOUSES.

The number of houses upon the register is 123, being a diminution of 2 upon the registration of the previous year. The desirability of obtaining the assistance of parish officers to aid the Commission in carrying out their rules, was strongly advised by the Medical Officer early in the year, and at the present time he informs me much assistance is obtained from that source.

CITY CEMETERY.

Early in the spring your Medical Officer, Dr. Letheby, reported that he had brought his examination of the vaults beneath the City churches to a close, that remedial measures had been applied to nearly the whole of them, and that works were in progress at the remainder ; those works have since been completed.

The church-yards being now entirely closed, and the nuisance formerly arising from the vaults removed, the evils of intramural sepulture may be said to be permanently abated in the City.

The City Cemetery at Ilford is now the substitute for the church-yards in the City. The interments in the cemetery during the year were 6,847.

MISCELLANEOUS.

The Street Indicator erected by permission of the Commission in the centre of Holborn, not being maintained according to the conditions imposed, is now under order of removal. This mode of advertising, imported from Paris, has apparently not found favour in this metropolis, for few Indicators have been erected, and the whole have ceased to be worked.

The new street name tablets of Mr. Davis have been fixed as directed; they have hitherto answered their purpose satisfactorily.

The question of street tramways or railways was during the summer again brought before the Commission by an application for permission to lay down lines of railway through some of the leading thoroughfares, to enable omnibuses to be drawn along the same by horses; the consideration having been adjourned for some months was, towards the end of the year, resumed, and ultimately permission was given, under certain conditions, to lay down a line within the City from Finsbury to the Bank. This question of street railways is likely to become one of metropolitan importance; it is undoubtedly

beset with much difficulty, but the crowded state of the streets, and the inconvenience and discomfort now attending travelling by vehicles, make a trial of that which holds out some chance of improvement desirable, if not obligatory.

Various Railway Companies gave notice of their intention of applying for powers to enter the City, but the London, Chatham, and Dover Extension Railway Bill was the only one which passed the Legislature; the Company has not yet acquired a site within the City.

A Bill entitled the Metropolis Local Management Act Amendment Bill, which sought to charge upon the Commission a portion of the expenditure of the late Metropolitan Commissioners of Sewers for works in connection with the Counters Creek and Ravensbourne Sewers, and which was deemed most objectionable in other particulars—especially in its tendency to centralize power in the hands of the Metropolitan Board, and destroy much of the power of local boards—was opposed in committee of the House of Commons by the Commission as well as by various Metropolitan Parishes: and which, after passing committees of both Houses, was thrown out by the House of Commons upon the third reading.

The subject of the injurious effects of Gas upon the street earth—the deodorization of the Sewage of London by the application of perchloride of

iron were reported upon by Dr. Letheby, and occupied the attention of the Commission.

The Adulteration of Food Act which became operative in August was also reported upon by Dr. Letheby; the preliminary arrangements for carrying it into effect were made by the Commission, and their Medical Officer was appointed Analyst under the Act.

The Metropolitan Gas Act which passed during last session was the subject of much debate; the operation of this Act remains to be seen; at present it has given but little public satisfaction.

I remain,

GENTLEMEN,

Your obedient Servant,

WILLIAM HAYWOOD,

Engineer and Surveyor.

List of Public Urinals existing within the City of London, at the end of the Year 1860, which have been constructed by the Commissioners of City Sewers, and are under their charge.

No of Urinals.	Situation.	No. of Compartments in Urinals.
1	Fye Fcot Lane.....	1
1	King's Head Court, Pudding Lane	1
1	Old Bailey, Northern End	6
1	Seething Lane.....	2
1	Shoe Lane	5
1	Thames Street, East Side of London Bridge..	2
1	Ditto West Side of ditto ..	2
1	Albion Place, London Wall	3
1	Jacob's Well Passage.....	1
1	Greenwich Street, Thames Street	1
1	Farringdon Street, North End	6
1	Ditto South End	6
1	Dove Court, Old Jewry	1
1	Little Swan Alley	1
1	Minories, South End	6
1	Lothbury	4
1	Glasshouse Yard.....	2
1	Cooper's Row	1
1	Little Bridge Street.....	3
1	Castle Court, Lawrence Lane	1
1	Great Swan Alley, Coleman Street	1
1	Bankruptcy Court, Guildhall Buildings	3
1	Mitre Square	1
1	Cavendish Court, Houndsditch	1
1	White Lion Court, Tower Street	1
1	Holborn, near Castle Street	2
1	Old Swan Lane, Thames Street.....	2
1	Talbot Court, Gracechurch Street	1
1	Upper Thames Street, by Calvert's	2
29		69

The whole of these have constant water supply ; have in all cases public lamps over them, and are cleansed twice daily: once by the scavenger, at the same time that the street is swept, and subsequently by a labourer specially appointed for the purpose.

REPORT

TO THE

HON. THE COMMISSIONERS OF SEWERS

OF THE

CITY OF LONDON,

UPON THE

CARBURATION OF GAS,

AS SUPPLIED TO THE

PUBLIC GAS LAMPS,

BY THE PROCESS OF THE

UNITED KINGDOM CARBURATING GAS COMPANY,

BY

WILLIAM HAYWOOD, M. INST. C.E., F.R.I.B.A.,

ENGINEER AND SURVEYOR TO THE COMMISSION.

30th July, 1861.

LONDON:

PRINTED BY M. LOWNDS, 148 $\frac{1}{2}$, FENCHURCH STREET, CITY. E.C.

1861.

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*At a Meeting of the Commissioners of
Sewers of the City of London, held
at the Guildhall, of the said City, on
Tuesday, 30th July, 1861:—*

The Engineer laid before the Court the following
Report

RECEIVED AND ORDERED—

That the same be printed, and circulated among
the Members of this Commission.

JOSEPH DAW,

Principal Clerk.

REPORT
UPON THE
CARBURATION OF GAS,
AS SUPPLIED TO THE
PUBLIC GAS LAMPS,
BY THE PROCESS OF THE
UNITED KINGDOM CARBURATING GAS COMPANY.

TO THE HONORABLE THE COMMISSIONERS OF
SEWERS OF THE CITY OF LONDON.

SEWERS' OFFICE, GUILDHALL,
30th July, 1861.

GENTLEMEN,

I beg to report, that in pursuance of the resolution of the court of the 23rd April last, I have directed an experiment with the view of testing the value of the application to the public lamps, of the process patented by the United Kingdom Carburing Gas Company.

The patent of this Company is for placing near to the gas burners a receptacle containing coal naphtha, the gas passing through or over this takes up, and becomes enriched by the addition of the

volatile hydro carbons contained in the naptha, and the illuminating power of the gas is thereby increased; the quality of the naptha employed determines mainly the degree of illuminating power gained, and the chemical and photometrical experiments laid before me show that it varies from 25 per cent. to 77 per cent. See Appendix.

The experiment being one in which the Gas Companies are much interested, I applied to the Chartered Company, who light Moorgate Street, suggesting their co-operation in conducting it with me, the suggestion was at once acceded to, and their Inspector, Mr. Johnson, was placed in communication with me for that purpose.

Moorgate Street was selected as well adapted for the experiment, there being an equal number of lamps upon each side of the way, but one or two private lamps only in the street, and but few shops; the street is, therefore, after an early hour of the evening almost entirely without artificial light, excepting that which it derives from the public gas lights.

The patentees stating, that by the application of their process equal light would be given, with half the ordinary consumption of gas; the burners were regulated accordingly.

The lamps experimented upon were twelve in number, six upon the western side which were fitted with the ordinary batswing burners calcu-

lated to consume upon the average of the night 5 cubic feet of gas per hour, and six upon the eastern side fitted with batwing burners calculated to consume $2\frac{1}{2}$ cubic feet per hour. The latter burners having attached to them the carburating apparatus of the Company, each of the twelve burners had a meter attached to it, to ascertain the actual consumption. No pressure regulators were fixed upon the lamps.

The registration commenced upon the 19th of June, and terminated upon the 19th of July inst., the experiment extending therefore over thirty nights, and gave the following results.

That the burners without the carburating apparatus consumed about 4.39 cubic feet per hour.

That the burners fitted up with the carburating apparatus consumed 2.09 cubic feet per hour.

No photometer was employed, the equalization of the amount of light given by the two classes of burners was a matter of judgment. The District Inspector of the Commission, who saw the lights nightly, reports his opinion that the light given was perfectly equal, and that his opinion is strengthened by collecting those of certain residents in the neighbourhood. My own opinion is that the light of the $2\frac{1}{2}$ feet burners was upon the average of the month inferior, although but very slightly so, to that of the 5 feet burners. The

Inspector of the Chartered Company coincides with me in this.

No chemical analysis was made of the naptha used; but it is stated by the patentees to have been of the best quality.

My deduction from the experiment is, that with naptha of equal quality to that used, that during the warm months of the year 3 cubic feet of carburated gas may be considered as about equal to 5 cubic feet of gas not carburated.

Assuming this to be data applicable to all seasons of the year, I have estimated the saving to be effected by the process, and after allowing for the cost of the apparatus, and for periodically filling it with naptha, and after giving credit at the present price of the gas supplied to the public lamps for the quantity not consumed, it shows that the reduction in the cost of each public lamp will be at least £1 per annum; and there being 2,825 lamps within the City, that a saving of about £2,825 would be annually effected.

The only disadvantage observed during the experiment was that the reservoir as constructed, throws a disk of shadow round the base of the gas lamp standard, but the depth of shadow is but slight; this disadvantage may be largely rectified by an alteration in the form of apparatus.

It should be understood that I do not pledge myself to any of these figures as exact, for the

experiment as conducted cannot lay claim to be considered minute or exact in its character; but I believe it may, nevertheless, be taken as giving a close approximation to the truth; it is the mean of the rough results of practice, and the refined processes of the laboratory from which reliable data are generally drawn; in this case the results of the experiment are supported by laboratory experiments, and consequently there seems but little doubt that this *mode* of applying naphtha to the public lights (for the naphthalization of gas itself is by no means new), may lead to a considerable reduction in the cost of public lighting; but what that reduction ultimately would be, would depend upon points which can only be determined by the application of the process to a considerable number of lamps for some length of time, and at different seasons.

I have the honor to remain,

GENTLEMEN,

Your most obedient Servant,

WILLIAM HAYWOOD,

Engineer.

APPENDIX

APPENDIX

APPENDIX.

The apparatus consists of a chamber for holding coal naphtha, and of a contrivance for directing the stream of gas over the surface of the naphtha. By this means the gas becomes charged with volatile hydro carbons, and acquires a higher illuminating power.

Three sets of experiments were made for the purpose of determining the value of the apparatus. In the first set a naphtha rich in benzole was employed, and the results were, that at first it raised the illuminating power of ordinary *twelve*-candle gas to *twenty-four* candles, and in the course of three days the power fell to eighteen candles, the mean of the whole being twenty-one candles. This is an increase of 77 *per cent.*, and it was effected by giving 10·77 grains of naphtha vapour to each cubic foot of gas.

In both of the other sets of experiments an inferior kind of naphtha was used, and in one case the average increase of illuminating power, during a period of ten days, and after the passage of a thousand cubic feet of gas, was 25 *per cent.* In the other case, after a duration of five days, the average increase was 30 *per cent.* The former was

effected by the addition of four grains of naphtha vapour to each cubic foot of gas, and the latter by 6.56 grains.

These data are sufficient to indicate the general capabilities of the apparatus, for they show that with a good naphtha, supplied in proper quantity, and furnishing from ten to eleven grains of vapour to each cubic foot of gas, the illuminating power of an inferior gas may be NEARLY DOUBLED. A less volatile naphtha, giving only from four to seven grains of vapour per cubic foot, will increase the power of twelve-candle gas from 25 to 30 per cent. I am, therefore, of opinion, that the apparatus is of practical value as a carburetting agent, and that if supplied with good naphtha, in proper quantity, there will be no difficulty in sustaining a power of *twenty candles* with ordinary coal gas.

(Signed)

HY. LETHEBY, M.B., M.A., Ph.D.,

*And Professor of Chemistry in the College of the
London Hospital, and Chemical Referee in the
matter of Gas Supply to the Corporation of London.*

COLLEGE LABORATORY,

LONDON HOSPITAL,

February 4th, 1861.

REPORT
ON
CARBURATING GAS,
&c.

PRESENTED TO THE COURT OF SEWERS,

Tuesday, 19th November, 1861,

AND THEN ORDERED TO BE PRINTED.

TO THE HONORABLE COMMISSIONERS OF
SEWERS OF THE CITY OF LONDON.

SEWERS' OFFICE, GUILDHALL,
19th November, 1861.

GENTLEMEN,

We beg to report that we have carefully considered the subject of reference of 15th October last, which was to the following effect:—

“Resolved that it be referred to the Engineer and Medical Officer of Health, to consider the conditions of the contracts for public lighting; having special reference to the

increased illuminating power of the gas to be supplied, and to the possibility of carburating the gas by the process of the Carburating Company."

Before considering the general conditions of a contract, it is necessary firstly to obtain the determination of your Honorable Board to the leading principles upon which the contract should be framed, and it is to those we now specially address ourselves.

As regards that portion of the reference which relates to the possible reduction of the consumption of gas in the street lamps, we are of opinion that, if the carburating process is not applied, the increase of the illuminating power proposed by the Metropolis Gas Act of 1861, does not render it expedient to diminish the amount of gas to be supplied at the burners of the public lamps; and that the contract should therefore remain as heretofore in this respect, unless the Companies alter the quality of the present supply, and furnish cannel gas to the public lamps, as the Act of Parliament empowers them to do: under which circumstances it will be necessary to re-adjust the contract and mode of supply accordingly.

With regard to the carburating process, we are

of opinion, from the data obtained by the laboratory experiments quoted in the report to the Commission of the 30th July last, and the experiments made on the public lamps in Moorgate Street, during the months of June and July last, that the process of carburation appears to be capable of economizing the use of gas in the public lamps, to the extent of from 40 to 50 per cent. This conclusion is founded on the assumption that the best quality of naptha is to be used, namely, a naptha which will give to the gas continuously a proportion of about ten grains of volatile hydro-carbon to each cubic foot of gas: these being the average results of the laboratory experiments. If an inferior kind of naptha be employed, the results will be less satisfactory; for the laboratory experiments, show that a naptha yielding four grains of volatile hydro-carbon, will increase the illuminating power of the gas to only about from 15 to 20 per cent.

It is manifest, therefore, that the practical efficacy of these results will be entirely dependent on the perfection of the apparatus and the quality of the naptha, and we are of opinion that these essential conditions can only be secured during the earlier application of the process by an arrangement with the Carburating Company for the supply of the apparatus and the naptha, as also for the

maintenance of the same in complete working order according to the terms of a contract founded on the preceding data, namely, that a burner consuming three feet of the naphthalized gas per hour shall give continuously the light of a burner consuming five feet per hour of the same gas not naphthalized; and to secure this, the naphtha should be of such quality as to furnish continuously not less than seven grains of volatile hydro-carbon to each cubic foot of the gas. If the Company is willing to undertake such a contract upon suitable terms, we see no difficulty in the practical application of the system.

If these suggestions are adopted, it will be necessary to contract both with the gas companies and the Carburating Company; the terms of such contracts which should have due relation to each other must be a matter of future consideration.

We have the honor to remain,

GENTLEMEN,

Your obedient Servants,

WILLIAM HAYWOOD,
HY. LETHEBY.

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REPORT

TO THE

HONORABLE THE COMMISSIONERS OF SEWERS

OF THE

CITY OF LONDON,

UPON THE RESULTS OF THE EXPERIMENT OF
APPLYING CHARCOAL TO THE SEWER
VENTILATORS.

BY

H. LETHEBY, M.B., M.A., PH.D.,

MEDICAL OFFICER OF HEALTH;

AND

W. HAYWOOD, M. INST. C.E., F.R.I.B.A.,

ENGINEER AND SURVEYOR.

21ST JANUARY, 1862.

LONDON:

M. LOWNDS, PRINTER, 148 $\frac{1}{2}$, FENCHURCH STREET, CITY.

1862.

*At a Meeting of the Commissioners of
Sewers of the City of London, held at
the Guildhall of the said City, on Tuesday,
January 21st, 1862:—*

A joint Report by the Engineer and Medical Officer of Health, on the subject of the application of Charcoal in the Ventilation of Sewers was laid before the Court.

ORDERED—

That the same be printed, and a copy be sent to every Member of this Court.

JOSEPH DAW,

Principal Clerk.

REPORT

TO THE

HONORABLE THE COMMISSIONERS OF SEWERS

OF THE

CITY OF LONDON,

UPON THE RESULTS OF THE EXPERIMENT OF APPLYING
CHARCOAL TO THE SEWER VENTILATORS.

TO THE HONORABLE THE COMMISSIONERS OF
SEWERS OF THE CITY OF LONDON.

SEWERS' OFFICE, GUILDHALL,

21st January, 1862.

GENTLEMEN,

1. We beg to report that, in pursuance of the resolution of the Commission, we have conducted an experiment with the view of testing the effects of the application of charcoal to the ventilating openings of the Sewers.

2. It will be remembered that this experiment was suggested by the facts detailed in the Report of the Medical Officer on the Ventilation of Sewers, and on Sewer Gases, in 1858, wherein he described the powerful oxydising effect of charcoal as determined by the investigations of Lowitz, Saussure, Thenard, and others, at the beginning of the present century, as well as by the recent inquiries and practical results obtained by Dr. Stenhouse. All of these tend to prove that charcoal has the power of absorbing and oxydising the miasms of organic decomposition, when, with atmospheric air, they are passed over it. In commenting on these facts, it was remarked that in common wood charcoal there was evidently a powerful means of destroying the foul gases of sewers; and that the practical application of it was fortunately a question of but little embarrassment; for to use the words of the Report, "let the sewers be ventilated as they may, either by open gratings in the streets, or by the rain water pipes in the houses, or by the pillars of the gas lamps, or by tubes carried up at the landlord's expense from the drains of every house, or by especial shafts in the public streets—in fact, let the gases go out of the sewers how they will, and where they will, you have but to place a small box containing a few pennyworths of charcoal, in the course of the draft, and the purification of the air will be complete. As far as we know, the strength

and the endurance of this power is almost unlimited, so that when once the air filter has been set up, it will last continuously for years. Its action also upon the draft cannot be particularly injurious; and I have no doubt that the temperature of the sewers, and the agencies which are now at work in circulating the air, and ventilating them, will be sufficient to keep up a current of foul air through the filters; and if these were multiplied to a large extent, the friction of the gases upon the charcoal would be reduced to an insignificant amount."

3. Acting on this recommendation, the Engineer was instructed to report on the practical capabilities of the suggestion; and he advised in his Report of 22nd November, 1858, that the proper mode of ascertaining the cost and effect would be to select "a limited district; adapt the existing ventilators in the first place; add to their number, and perfect the system to such an extent as may be practicable; and watch, and record the results before adopting it for the whole City."

4. The consequence was, that it was decided that an experiment should be made. A district was therefore selected, and plans were prepared for the application of the process on a considerable scale towards the end of the year 1859.

5. The district experimented upon is in the Eastern portion of the City of London. It includes a space bounded by Bishopsgate Street on the west, from Cornhill to Widegate Street; by Middlesex Street and Somerset Street, on the east, to the City boundary; and by the Minories and then by Leadenhall Street to Cornhill on the south; the whole of the main thoroughfares above-named being included in the area. It comprises a space of about fifty-nine acres, with about 1,700 houses, and about 14,000 inhabitants.

6. This district was selected for various reasons: 1st, because the sewers have but a slight fall, and the currents in them are sluggish; 2nd, the area is densely populated, and has more than an average proportion of resident poor in it; 3rd, the thoroughfares are mostly narrow, and are, therefore, disagreeably affected by the sewer gases which issue from the ventilators; 4th, the district affords comparatively good means of isolation from other sewers.

7. The total length of sewers in the district is 25,587 feet; of which 2,081 feet are pipes, and the remainder are constructed of brick, varying from 3 feet high by 2 feet wide, to 5 feet high by 3 feet wide, internal dimensions.

8. Upon this length of sewer there are 104

air shafts, 265 gullies, 15 flushing shafts, 4 tanks, and 26 side entrances.

9. The number and condition of the house drains entering the sewers are, upon the average, the same as those of other sewers within the City.

10. The whole of these sewers were isolated as far as possible, so as to prevent air currents passing through them either from, or to the adjacent sewers; and, as we have said, the general arrangement of the sewers of the district admitted of such isolation being effected with considerable completeness, so that the sewers were dependent upon their own conditions for ventilation.

11. There were two varieties of mechanical arrangements adopted for applying the charcoal; one was that patented by Messrs. Bean and Burgess, which consisted of one large sieve with compartments, the other was an adaptation of our own; and, consisted of a series of trays for holding the charcoal, and were so constructed as to be capable of being readily removed from the frames into which they fitted. The principle of the arrangement will be best understood by reference to the drawings submitted; but owing to differences in the construction of the existing air shafts and the contiguous gullies, as well as

the impediments offered by gas and water pipes, the mode of fixing the ventilators was at places considerably varied.

12. Wood charcoal was employed, broken into pieces of the size of a filbert. It was packed closely, but without compression, upon the various trays ; and each tray held about $1\frac{1}{2}$ lbs. of charcoal, making altogether $6\frac{1}{2}$ lbs., distributed over the six trays of each air filter.

13. The experiment was commenced on the 14th of July, 1860, and is still in operation. It has, therefore, been continued for a period of rather more than eighteen months. A single air filter (the first affixed within the City) was, however, put into action in Philpot Lane, early in the summer of 1859. This was done to remedy the cause of complaint from the inhabitants of the lane, who, it has been stated, suffered very severely from the effluvium from the ventilating gratings. That apparatus is still in action, and has continued effective for more than two years.*

* Mr. Capes, a medical man then resident in Philpot Lane, complained much of the nuisance arising from the ventilation in that street, and stated that nine or ten deaths had occurred about the same time in houses situated there. His complaints were referred to the Engineer and Medical Officer, who recommended the effect of the charcoal to be tried.

14. During the summer and autumn of 1860 the temperature of the air was low, and the rainfall was great. These had an influence in checking putrefaction and in scouring the sewers; we were, therefore, unable during that year, to form an opinion of the efficacy of the filters; but in 1861, when the conditions of the atmosphere were more favourable for observation, we were able to gather sufficient facts for the present Report.

15. The points to which we have directed our attention are the following:—

1st. The deodorizing power of the charcoal.

2nd. The length of time that the same charge of charcoal will continue to deodorize the sewer gases.

3rd. The effect the air filters have on the ventilation and temperature of the sewers.

4th. The exact cost of the experiment, so as to obtain data from which to estimate the probable expense of the process if it were applied to the whole city, or even to the metropolis.

16. *First.* The deodorizing power of the charcoal has been satisfactorily proved to be complete. Not only have there been no complaints from the public of stench from the ventilating gratings, but we have ascertained by actual observation that

the odour of the sewer gases is not perceptible when they have traversed the charcoal. This, indeed, might have been predicated, from the extensive laboratory experiments, and the other practical inquiries to which we have alluded.

17. Charcoal from the ventilators has been submitted to chemical examination after having been in action for from nine to twenty months, and when heated with water, it yields abundance of alkaline nitrate, showing that some of the organic miasmata have undergone complete oxydation. But besides these compounds, others are present, namely—peculiar alkaline salts, which indicate the fixation not only of ammonia, but also of other volatile nitrogenous bodies which are peculiar to organic decomposition. The nature of these compounds has yet to be determined, for all that can be said of them is that they have a remarkably bad odour, compounded of urine, sewage, bad meat, ammonia, and stale tobacco, attempts have been made to isolate them, but without success. This, however, is not surprising when we consider that chemists have hitherto failed to separate and identify the miasms of organic corruption.

18. Guntz, for example, tried to collect the volatile matters of putrid flesh, but he only obtained a stinking alkaline liquor that he could not analyse.

Moscatti condensed the organic vapour from the miasms of the pestilential rice fields of Tuscany, but the solution which he procured defied investigation, notwithstanding that it was so highly charged with organic matter as to putrefy quickly. Rigaud did the same with the atmosphere of the marshes of Languedoc, and Boussingault with the air of some of the worst districts of Paris. We have ourselves sought for the putrid miasms which infect the overcrowded dwellings of the poor; and although the liquid obtained in each case is so charged with alkaline organic compounds as to blacken sulphuric acid, and reduce the salts of gold and silver, yet the nature of the miasms is still unknown. Graham thinks they are not actual vapours, but organic molecules, like the pollen of flowers, floating in the air. This was also the opinion of the late Dr. Wilson, of Edinburgh; and both of these chemists have adduced very cogent reasons for believing that the infection or disease producing molecule is not volatile in a strict chemical sense, but is merely diffused by suspension in the atmosphere. This may perhaps be true of the actual morbid agent, but there are also organic vapours of an alkaline nature present in these miasms, which are the invariable products of putrefaction. As far back as the year 1849, the researches of Dr. Stenhouse into the products of the decomposition of nitrogenous organic matters by heat, by acids, by

alkalies, and by spontaneous decay, demonstrated that "whenever ammonia is generated in large quantities from complex substances (either animal or vegetable), it is always accompanied by the formation of a larger or smaller amount of volatile organic bases." Many of these bases he collected and obtained in the form of an oily liquid, but it was so difficult to separate them that he was unable to determine their exact composition. More recently Dr. Crace Calvert has examined the volatile alkalies from putrefying flesh, and has found that they are very remarkable substances, containing carbon, nitrogen, hydrogen, phosphorus, and sulphur. Dr. Odling has also collected the alkaline emanations from sewage, and has ascertained that they are more complex than is usually supposed, for in addition to nitrogen and hydrogen, the constituents of ammonia, they contain carbon. Let them, however, be what they may, either physically suspended organic molecules, or complex volatile alkalies; and be the morbid agent either the one or the other, there is in charcoal a perfect means of arresting and oxydising all the noxious compounds contained in these gases. This is demonstrated not merely by their absence in the sewer air which has passed the charcoal, but also by the presence of the alkalies and the changed molecules in the charcoal itself.

19. *Second.* As to the duration of the powers of deodorization, we have hardly sufficient proof.

20. The charcoal appears to lose much of its power when saturated with water; and as the position in which the trays containing it are placed, is such, that leakage of water into them in times of rain is, to some extent, all but impossible; and as moreover the atmosphere of the sewers is always very moist, the charcoal becomes so wet as to require removal, long before it has failed as a deodorizer. Upon an average the sieves have been re-charged about once in three months. Those which have been in very wet situations have been re-filled much more frequently, and those in dry situations less.

21. If the situation of the ventilators could be so arranged as to keep the charcoal dry, we are of opinion that it would not require renewal more frequently than once in a year, perhaps not so often, but under existing circumstances many of them require to be changed not less often than once a month. Secure situations might, however, be obtained by enclosing the charcoal in the lower compartments of the lamp posts, and by other means which have been suggested in our previous reports, or by placing the ventilators against the sides of the houses, as in Philpot Lane. And here we may

remark that no apprehension need be felt of the escape of effluvium, for the experience of the last two years has proved beyond all doubt that this is impossible. We make prominent allusion to this fact, because there was great opposition on the part of the occupiers of houses when it was desired that the charcoal sieves should be placed against the outer walls of their premises; and we were therefore compelled, in arranging the experiment, to fix the filters in a much more expensive and inconvenient situation than we wished to do.

22. *Third.* The effect of the application of charcoal upon the general ventilation of the sewers, is a point of the highest importance, and is, unfortunately, one upon which, after the most careful consideration of the facts elicited by the experiment, we are unable to pronounce a very positive opinion.

23. The necessity for sewer ventilation has already been the subject of separate reports by each of us, and therefore it would be superfluous to dwell now at any length upon the subject. It is merely needful here to hold in remembrance that, whilst diminishing the escape of effluvium into the streets, it is essential that the dilution of the gases generated in the sewers should not be so lessened by the diminished supply of air, as to

render the atmosphere of the sewers dangerous to the men who work in them; and it is also equally essential that the effluvium should not find its way more freely or in a more concentrated state into the interior of houses, by the house drains and their inlets, than it already does. These two considerations deserve attention, and may be best examined separately.

24. As regards the sewers. We must first state that observations made within them by means of delicate anemometers and other means, have not exhibited any perceptible currents of air through the ventilators fitted up with the charcoal sieves; and also that observations of temperature made contemporaneously in sewers with and without the charcoal boxes, have tended to show that those with the charcoal sieves were less influenced by the external atmosphere than those without them, for they were cooler in the summer months and warmer in the winter; from which it might be inferred that the currents of air were somewhat interfered with, and that the ventilation of the sewers was not so perfect as in other cases: but it must at the same time be stated, that the differences in respect of temperature were extremely slight.

25. On the other hand, there appears to have

been no appreciable effect on the condition of the air within the sewers, as far as the experience and observations of the workmen have gone, for no complaints of a worse atmosphere have been made by them.

26. Chemical and physical considerations indeed would lead us to the conclusion that, although the coarsely granulated charcoal may offer some slight resistance to the passage of an actual current of air, it cannot affect the diffusive power of gases, which is so largely concerned in maintaining the chemical equilibrium of the atmosphere: in fact, experiment has shown that media, much denser than charcoal, will permit of the free interchange of air, and of the quick dilution of noxious effluvia. Again, the chemical condition of the internal atmosphere of the sewers, as far as analyses have gone, show a proportion of 79.96 per cent. of nitrogen, 19.51 per cent. of oxygen, and 0.53 per cent. of carbonic acid, with traces of ammonia, marsh gas, and sulphuretted hydrogen: there is, therefore, abundance of oxygen to maintain the functions of life.

27. We believe, therefore, we are justified in the conclusion, that the danger to the workmen in the sewers has not been materially increased by the application of charcoal to the ventilators. How far they would obstruct the passage of a large

quantity of coal gas escaping into the sewers, is yet a matter for observation. This gas is at all times dangerous, and is most frequently the cause of sewer accidents by explosion; fortunately, however, the presence of it is betrayed by its odour long before it reaches a dangerous proportion, and with due precaution, the risk of its exploding may be avoided.

28. And here, while discussing the accidents which are incidental to the presence of foul gases in the sewers, it may not be out of place to speak a little more fully concerning the safety of those who are exposed to them.

29. The deadly and morbid effect of concentrated sewers' gases is, unfortunately, a matter of common experience. Again and again it has happened, that these gases have killed with the energy of the most deadly poisons. In France, the fatal effects of sewer and cesspool miasms have been frequently observed; and the writings of Portal, Gériel, Labouire, Parmentier, Alibert, Dupuytren, Cade de Vaux, Hallé, Geraud, Parent-Duchâtelet, Chevalier, D'Arcet, Orfila, Devergie, and others, abound with instances of the fatal *mephitismés*, caused by the gases from the *fosses à'aisances*. In this country such accidents are of much rarer occurrence; for,

over a period of sixty years, there have been but five such accidents in the sewers of this metropolis: these, however, were the cause of eighteen deaths. One of these accidents occurred about a year ago in the sewer of Fleet Lane, and it was the first upon record within the sewers of this city. We have but little knowledge of the immediate cause of that accident, for the four men who were killed were the only persons in the sewer, and they seem to have died instantly; but the inquiries which were instituted at the time, suggested the necessity for some protection against a similar disaster.

30. The experience of our present investigations, as well as the results of laboratory experiments, point to the advantage which may be derived from the use of an apparatus in the form of a respirator, containing charcoal. Dr. Stenhouse has already contrived such an apparatus; and we believe that it might be resorted to by the men in times of danger, as when there is an odour of foul gas, and would afford them an opportunity of quitting the dangerous locality, and reaching a place of safety. It is very probable that under the worst circumstances, when the air is charged with a large proportion of sulphuretted hydrogen, there is still enough oxygen to maintain the functions of respiration: the danger indeed is not from the absence of

atmospheric oxygen, but from the presence of sulphuretted hydrogen; and this the charcoal of the respirator would destroy. It is desirable therefore that each of the sewer men be provided with a respirator of this construction, and be advised to use it when the air of the sewer is expected to be unusually offensive, and when they are disturbing large deposits of mud. There will be, doubtless, difficulty in compelling men to use these precautions; but if they are provided for their use, the Commission will have the satisfaction, should an accident again occur, of knowing they have done the utmost in their power to prevent it.

31. The second part of this branch of the inquiry—is as to the effect the introduction of the system has had upon the sanitary condition of the houses, as regards the escape of sewer gases into them from the drains. Upon this head our information is of a negative character. All that can be said is that we have had no evidence of increase of effluvium in the interior of dwellings; nor do the mortality or sickness returns indicate an unusual amount of disease of a pythogenic character. Unfortunately, as has been pointed out by your Engineer in his Report on the Ventilation of Sewers, there are evidences that from most of the house drains, even in the houses of the better

classes, where the inlets are supposed to be properly protected, effluvium periodically escapes into the dwellings, and is the cause of mischief; but that such escape has been in excess in the district alluded to, we can discover no proof.

32. As to the effects of the diluted gases when they find their way into dwellings, little need now be said, for the Medical Officer has already discussed the subject in his Report of 1858 on Sewage and Sewer Gases. Abundant evidence is there produced of the disease-producing agency of the diluted effluvium; and the sad experience of the last few months is sufficient to show how those gases may exert their action in places where they are hardly suspected to exist. It can no longer be doubted, after the experiments of Dr. Barker, and the clinical observations of Dr. Murchison, that these gases are concerned in producing a form of continued fever, which is very aptly termed from the cause, *pythogenic*. This fever is often seen in the filthy haunts of poverty where corruption is abundant; and its ravages are in proportion to the defective state of the drains and sewers. Twelve years ago, when Mr. Simon reported to you on the matter, he remarked that the constant prevalence of fever in certain courts and alleys of this city told, without reference to the Surveyor's Plan of the Sewers, that

they were then destitute of the means of perfect drainage ; and the occurrence of typhoid or gastric fever, even in the houses of the rich, is a matter for grave suspicion as to the state of the cesspools or the house drains and their appliances.

33. These considerations force upon our minds the conclusion, that wherever there is an escape of gases from the private drains or the public sewers, it is of the utmost importance that those gases should be destroyed as far as practicable ; and we are of opinion that by the application of these charcoal filters a remedy may in numerous cases be found.

34. *Fourth.* With respect to the cost of the process:—The expenditure incurred in fitting up the 104 ventilating shafts was £918. 18s. 5d., which is at the rate of about £8. 16s. 8d. per ventilator. An experiment is necessarily more costly than an established system, and a much less sum than this may be taken as a fair average of the probable expense of extending the process even to the whole of the City, where, as may be gathered from what we have before said, the difficulties in the adaptation of the existing ventilators are considerable, and the cost therefore large. The charges named will not therefore serve for esti-

mating the cost of adapting the shafts in districts which are less dense, and in streets which are less encumbered. Still less will it furnish an indication of the cost of the system when applied to new sewers, which may hereafter be constructed with the especial view to adopting it. In the latter case the cost, under well considered arrangements, would be very moderate.

35 The total expense of reparation and renewal of damaged trays, frames, and coverings, averaged 16s. 6d. per ventilator per annum. The cost of supervision, supplying, and changing the charcoal, was 8s. 9d. per ventilator, making together £1. 5s. 3d. per ventilator per annum. The very large cost for reparation was mainly attributable to the repeated breakages of one class of apparatus used, which is not found to be capable of standing the severe traffic of the City thoroughfares. This item might therefore at a future day be considerably lessened ; but if the process should be still applied in the manner herein detailed, much annual expense will always have to be incurred. We are confident, however, that with the experience already obtained, a more economical and effective mode of applying the process at the sides of the public way, or otherwise as suggested, might be adopted ; and in that case the expense of repara-

tion might probably be reduced by two-thirds, and that of maintenance would be very considerably reduced likewise.

36. Our general conclusions from these experiments, and from the consideration of collateral evidence are—that dry charcoal in the presence of atmospheric air is a powerful means of destroying the mephitic gases and vapours of sewers and house drains. That the charcoal filters may be used with efficacy in the course of the air channels from the drains and closets of houses, as well as in the ventilation of the public sewers; that in applying the charcoal, those contrivances should be used, which offer the least resistance to the free passage of the air; that the situation of the filters is best, when the charcoal is protected from wet and from dirt, and is easily accessible; that from the ascertained efficacy of charcoal in destroying the dangerous emanations from sewers, the system may be generally applied with great advantage; and that from the experience derived from this extensive practical inquiry, we are satisfied that the expense of the system might be considerably reduced below that indicated by the cost of the experiment.

37. Finally we have to state that we have departed from our usual custom in reporting sepa-

rately upon the matters referred to us, for the reason that, although the investigations have been necessarily carried out separately in the different branches with which we respectively are most competent to deal, yet joint action and consideration of the whole has been a frequent necessity during the last two years, and the result of our investigations are capable of being presented in a clearer and more comprehensive manner for general reading, than if given in two separate and distinct reports.

We have the honour to remain,

GENTLEMEN,

Your most obedient Servants,

WILLIAM HAYWOOD,

Engineer and Surveyor.

HENRY LETHEBY,

Medical Officer of Health.

REPORT
OF THE
WORKS EXECUTED
BY THE
HON. THE COMMISSIONERS OF SEWERS
OF THE
CITY OF LONDON,
DURING THE YEAR 1861.

BY
WILLIAM HAYWOOD, M. INST. C.E., F.R.I.B.A.,
ENGINEER AND SURVEYOR TO THE COMMISSION.

4th February, 1862.

LONDON:
PRINTED BY M. LOWNDS, 148 $\frac{1}{2}$, FENCHURCH STREET, E.C.
1862.

*At a Meeting of the Commissioners of
Sewers of the City of London, held at
the Guildhall of the said City, on Tuesday,
4th February, 1862:—*

The Engineer and Surveyor laid before the
Court a Report as under:—

ORDERED—

That the same be printed, and a copy be sent to
every Member of this Court.

JOSEPH DAW,

Principal Clerk.

REPORT

OF THE

WORKS EXECUTED BY THE HONORABLE
THE COMMISSIONERS OF SEWERS

OF THE

CITY OF LONDON,

DURING THE YEAR 1861.

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REPORT

OF THE

WORKS EXECUTED BY THE HONORABLE
THE COMMISSIONERS OF SEWERS

OF THE

CITY OF LONDON,

DURING THE YEAR 1861.

TO THE HONORABLE THE COMMISSIONERS OF
SEWERS OF THE CITY OF LONDON.

SEWERS' OFFICE, GUILDHALL,
4th February, 1862.

GENTLEMEN,

I beg to lay before you my Report upon the works you have executed, and upon your transactions generally during the year 1861.

SEWERS.

The total length of new sewers built was 1,596 feet, of which 1,402 feet were reconstructed upon the lines of old sewers.

The experiment of applying charcoal to the

sewer ventilators, so as to destroy offensive emanations, is still in operation; the year 1861 was favourable for watching the results which have already been reported upon by Dr. Letheby and myself.

Upon February 8th, four labourers were found dead in the Fleet Lane Sewer, in which they had been working; this is the most serious accident of which there is any record that has taken place within the sewers of the City of London.

The circumstances attending this calamity are remarkable owing to the apparent absence of all those conditions which are usually found in connection with such accidents; the sewer is new, with a rapid inclination, and an ample flow of water; these maintain the sewer free from deposit of any description whatever, excepting at the outlet, where, owing to the current in the Fleet Sewer, some detritus from the roads and pavements is deposited; but which deposit, is constantly washed by the current of the sewer itself, as well as by the tidal waters of the river which rise above it twice every twenty-four hours; the sewer is, moreover, thoroughly well ventilated, and is undoubtedly one which would have been pronounced by all competent persons entirely free from danger.

The fullest inquiry was made as to the causes of the accident, but without arriving at any satisfactory solution, and the inquest jury, upon 15th

February, returned a verdict of "accidental death." The investigation has been pursued since that date, but no further light has been thrown upon the source of accident.

The opinion of Dr. Letheby was that their deaths were attributable to the action of sulphuretted hydrogen, and he conjectured that it was suddenly generated in the sewer by the action of acids discharged into it and acting upon deposit; but how it was generated in such a situation, in sufficient quantity and intensity under the circumstances before mentioned to produce the accident, is still involved in mystery. It is, however, certain that if the sudden discharge of acid into the sewer was the proximate reason, there must be those who are conscious of having probably, although innocently, caused the accident; but they have not yet come forward to aid the authorities in arriving at a just conclusion, or to suggest measures so as to prevent the recurrence of so fearful a destruction of human life.

HOUSE DRAINAGE.

The total number of premises drained	
during the year 1861, was	144
The approximate number of premises	
known to be drained at the end of	
the year 1860, was, ...	13,040

The total number of houses of which some record is now possessed as to their being drained, is about 13,184

The approximate number of premises about the drainage of which nothing is known, and which have hitherto been set down as undrained, is about 2,816

HOUSE DRAINAGE PLANS.

During the year 119 plans for the drainage of 144 houses were made, nearly one-half of which were for the drainage of new premises.

IMPROVEMENTS.

Improvements were effected by setting back the fronts of Nos. 60 and 61, Great Tower Street; No. 70, Watling Street; the house at the corner of Godliman Street and Little Knight Rider Street; three houses on the eastern side of Little Trinity Lane; No. 3, Little Knight Rider Street; houses on the south side of Little Carter Lane by Sermon Lane; property on the western side of St. Andrews Hill; the house at the corner of Maiden Lane and Queen Street; and property at the northern end of Basinghall Street; King Edward Street has also been widened at its southern end; and the whole

of the property on the north side of Newgate Street, between King Edward Street and Bath Street, has been set back to the improved line.

Arrangements have been completed for setting back the fronts of Nos. 189, Fleet Street; 39, Lothbury; 69A, Leadenhall Street; 59, Great Tower Street; and property on the eastern side of Little Distaff Lane. Measures have also been taken for Widening Great Tower Street between Tower Hill and Seething Lane.

Negotiations are pending for setting back the front of the house, 39, Throgmorton Street; for widening London House Yard between Paternoster Row and St. Paul's Churchyard, and improving the thoroughfare at the eastern end of Threadneedle Street; for widening portion of Silver Street, Wood Street; and the eastern ends of Fenchurch Street and Leadenhall Street. Ground has been purchased also with the view of improving the public ways leading out of and across Angel Alley, Bishopsgate Street; and the question of widening the northern end of Lime Street is also under consideration.

SURFACE CLEANSING AND REMOVING DUST FROM PREMISES.

The contracts for scavenging and dusting were let from Midsummer, 1861, to Midsummer, 1862,

for £8,252, which was £527 less than the letting of the previous year.

The scavenging was satisfactorily performed, but the removal of dust was too often neglected, and one of the contractors was fined heavily at different periods.

STREET SURFACE WATERING.

The contracts were let at £1,327, being £64 more than the previous letting. Nothing worthy of remark occurred under this head.

PAVEMENTS.

Cheapside and Cannon Street West, and the western end of Fenchurch Street, were paved with new stone.

The principal carriage-ways re-laid were those of Petticoat Lane, Long Lane, Redcross Street, Fetter Lane, Giltspur Street, Warwick Lane, Falcon Square, Dean Street, and portion of Bishopsgate Street. The wood pavements of Gracechurch Street and Cornhill were re-laid.

URINALS.

That removed from Foster Lane, at the request of the authorities of the Post Office in 1860, was

re-built, and one was constructed in Black Swan Alley, St. Paul's Churchyard.

PUBLIC LAMP LIGHTING.

The contracts with the Companies lighting the public lamps expire naturally at Midsummer, 1862; but by the Metropolitan Gas Act of 1860, all then existing contracts between the District Boards and the Metropolitan Gas Companies were made to expire on the 31st January, 1862, it became therefore needful to re-contract for lighting the public lamps at an earlier period than usual, and advertisements were accordingly issued in December last.

During the months of June and July, an experiment was made in Moorgate Street, by carburetting the gas supplied to the public lamps in the manner suggested by the United Kingdom Carburing Gas Company; the result of the experiment demonstrated that a considerable saving might be effected by the application of the process.

With the view of economising gas, it was determined therefore so to frame the specification for the new contracts for the public lighting, that the Commission might, if they thought fit, adopt the carburetting process; but upon opening the tenders, it was found that they were made declining alto-

gether the terms contained in the specification submitted to them, as being more stringent and involving the Companies in responsibilities which they were not desirous of undertaking, but the Companies tendered to light the public lamps upon the terms of the former (then existing) contracts, excepting in so far as they were necessarily altered by the Metropolis Gas Act of 1862.

Tenders were required for lighting the public lamps for one year with burners consuming 5 cubic feet and 3 cubic feet of gas per hour respectively, for which the following prices only were sent in:—

		Tendered Sum per Annum for Bats- wing Burners consuming						
		3 cubic feet of common gas per hour.			5 cubic feet of common gas per hour.			
		£.	s.	d.	£.	s.	d.	
The City of London Gas								
Company		3	11	0	..	5	5	0
The Chartered, ditto ..		2	18	6	..	4	14	6
The Great Central, ditto		Nil.			..	4	10	0

The Chartered Company's tender for the North Eastern District was accepted, the burners to consume 5 cubic feet per hour.

That of the City was accepted for the South-Western District, the burners to be employed being those consuming 3 cubic feet per hour, the Commission giving notice of their intention to employ

the carburetting process at each of the lamps and itself taking the responsibility of the process.

Subsequently the City Company declined to supply the gas if the carburetting process was employed, and a tender from the Great Central Company was obtained and accepted, the Commission having arranged with the Carburating Company to carburate each lamp in the district at 16s. per lamp per annum.

The prices of the public lighting for the present year therefore are:—

The Chartered Company.—Burners consuming 5 cubic feet per hour, at per burner per annum	£.	s.	d.
	4	14	6
The Great Central Company.—Burners consuming 3 cubic feet per hour ..	3	0	0
Carburating the gas	0	16	0
Total per burner per annum	£3	16	0

WATER SUPPLY.

The amount paid by the Commission this year for water was as follows:—

For supply to Urinals	£313	10	7
For Flushing Sewers	15	6	0
For Washing Courts	104	12	0
Total	£433	8	7

That for street surface watering is only paid indirectly by the Commission, the contractors for that work finding carts, labour, and water under the terms of their contract.

DANGEROUS STRUCTURES.

The business transacted by the Commission under the Metropolitan Buildings' Act may be gathered from the following summary of cases:—

Number of structures reported upon by the	
Surveyors appointed by the Commission ..	92
Number of cases heard before the Magistrate .	12
Number of buildings shored up during the	
year	8
Number of cases certified by the Surveyors as	
being completed	82

This is a great reduction in number as compared with the year 1860.

DRINKING FOUNTAINS.

An additional drinking fountain was erected in Moor Lane, and that for which permission was given by the Commission in 1858, was erected in front of the Royal Exchange.

The number of drinking fountains now within the City are as follows:—

Situation.	Name of Donor.
One at the corner of St. Mary-le-Bow Church, in Bow Lane	Messrs. Copestake and Company.
One at the corner of St. Sepulchre's Church Yard, at the corner of Giltspur Street	S. Gurney, Esq., M.P.
One at Fleet Street, in front of the Church of St. Dunstan's in the West	Sir James Duke, Bart., M.P., Alderman, &c.
One at Adelaide Place, London Bridge	The United Kingdom Temperance and General Provident Institution
One in Bishopsgate Street, Without, in front of the Church of St. Botolph, Bishopsgate	C. Gilpin, Esq., M.P.
One in Moor Lane, opposite the Police Station	Mrs. Smee.
One in front of the Royal Exchange	S. Gurney, Esq., M.P.

HOUSE INSPECTION AND REMOVAL OF NUISANCES.

From the return prepared by your Principal Clerk it appears that during the year, 9,111 inspections of houses were made by the district inspectors under the direction of your Medical Officer of Health, and, consequent upon their reports, the following notices were issued:—

For works of drainage	13
For preventing the issue of waste water upon the surface of pavements	54
For lime-whiting and cleansing the interior of premises	1,052
Total.....	1,119

SLAUGHTER-HOUSES.

The number of slaughter-houses existing in the City is now 66, being the same as at the end of 1859. The regulations for these are again under revision.

COW-HOUSES.

The number of cow-houses is now 18, being 2 less than at the end of 1859.

LODGING-HOUSES.

The number of houses upon the register is 126, being an increase of 2 upon the registration of the previous year.

CITY CEMETERY.

The number of interments in the Cemetery during the year 1861, was 8,104.

The large and increasing number of interments which now annually take place in the Cemetery, rendered it expedient in the opinion of the Board to enlarge its area, and $15\frac{1}{2}$ additional acres are now being enclosed and laid out, the total area will then be 105 acres.

MISCELLANEOUS.

At the commencement of the year there were ten different projects for railways and other purposes for which bills had been deposited, and which affected the City of London; the aggregate area of property scheduled by them amounting to 84 acres, or about 1-7th of the entire City.

Those which passed the Legislature were the Metropolitan Railway Extension to Finsbury Act, The Metropolitan Railway Improvements Act, The

North London Railway (Branch to City) Act, and the Charing Cross Railway City Terminus Act; with the whole of these Companies the Commission were enabled to make satisfactory arrangements for the public convenience.

I have the honor to remain,

GENTLEMEN,

Your most obedient Servant,

WILLIAM HAYWOOD,

Engineer and Surveyor.

REPORT

TO THE

HONOURABLE THE COMMITTEE UPON GENERAL
PURPOSES OF THE COMMISSIONERS OF
SEWERS OF THE CITY OF LONDON,

ON THE

RESULTS OF EXPERIMENTS

TO ASCERTAIN THE

CONSUMPTION OF GAS

AT THE PUBLIC LAMPS;

AND

ON THE APPLICATION OF THE CARBURATING
PROCESS, &c., &c.

BY

W. HAYWOOD, ENGINEER,

AND

H. LETHEBY, MEDICAL OFFICER OF HEALTH
TO THE COMMISSION.

NOVEMBER THE 3RD, 1862.

LONDON :

M. LOWNDS, PRINTER, 148 $\frac{1}{2}$, FENCHURCH STREET, CITY.

1862.

*At a Meeting of the Committee upon General
Purposes of the Commissioners of Sewers
of the City of London, held at the Guild-
hall of the said City, on Wednesday, the
12th November, 1862.*

IT WAS ORDERED—

That the Report of the Surveyor and Dr. Letheby,
on the application of Meters to the Public Lamps,
&c., &c., now read, be printed, and a copy sent to
every Commissioner.

JOSEPH DAW,
Principal Clerk.

REPORT

TO THE HONOURABLE THE COMMITTEE UPON GENERAL
PURPOSES OF THE COMMISSIONERS OF SEWERS OF THE
CITY OF LONDON, ON THE

RESULTS OF EXPERIMENTS TO ASCERTAIN
THE CONSUMPTION OF GAS AT THE
PUBLIC LAMPS,

AND ON

THE APPLICATION OF THE CARBURATING PROCESS, &c., &c.

TO THE HONOURABLE THE COMMITTEE UPON
GENERAL PURPOSES OF THE COMMISSIONERS
OF SEWERS OF THE CITY OF LONDON.

SEWERS OFFICE, GUILDHALL,
3rd November, 1862.

GENTLEMEN,

In pursuance of your reference, I have taken measures to ascertain the amount of gas consumed at the public lamps within your jurisdiction; and also, in conjunction with your Medical Officer of Health, Dr. Letheby, to ascertain, when deficiency of light is complained of, where carburators are affixed to the public lamps, if it be attributable to the fault of the Gas Company or the Carburating Company.

Thirty-eight meters have been affixed, which register the consumption of gas at forty-two public lamps—the situations of which include some of the highest as well as the lowest surface levels within the City.

Of the meters—

26 are affixed upon lamp columns.

8 are placed beneath the ground at the base of the columns.

4 are attached to the brackets of lamps projecting from the walls of buildings.

The first meter was affixed on the 2nd of September, and thirty-six were affixed by the 1st of October; the remaining two on the 21st of October. All the following statements and averages are from observations made between the 2nd of September and the 25th of October inclusive.

Seven meters were affixed to lamps at which, by the terms of the contract with the Company, five cubic feet per hour were to be consumed: these are without carburators, and are supplied with gas by the Chartered Gas Company. Thirty-one are affixed to lamps consuming, according to contract, three cubic feet per hour: they are in all cases fitted with a carburating apparatus, and are supplied with gas by the Great Central Gas Company.

The indices of the meters have been carefully recorded from time to time, and the averages of consumption throughout the experiment have been found to be as follows:—

For the first three nights after the meters were affixed—

	Cubic feet per hour.
Of the 31 meters to the 3-foot burners,	
20 showed a consumption of	2.59
11 " " 	3.33
The 6 meters affixed to the 5-foot burners	
showed a consumption of	4.68

The twenty meters to the 3-foot lamps then began to register, like the others, more than the stipulated quantity of gas; those upon the 5-foot lamps continued without marked alteration; the average of the whole time showing that,

	Cubic feet per hour.
The burners under contract to be supplied	
with 3 cubic feet of gas per hour, con-	
sumed	3.35
The burners under contract to be supplied	
with 5 cubic feet of gas per hour, con-	
sumed	4.69

The quantity consumed from hour to hour and at different lamps has been found to vary considerably.

With 3-foot burners, the mean range of consumption during the night has been from 1·83 to 6·30 cubic feet per hour.

With 5-foot burners, from 3·65 to 7·31 cubic feet per hour.

These are the extremes which have been observed, and there has been every variety in the rate of consumption per hour between those limits.

In some lamps there has been less than the stipulated quantity consumed for a few days; then a large increase has taken place for a few subsequent days, and then the consumption has fallen to about its average quantity. In a few instances unusually large quantities of gas has passed through the meters, between the hours at which registrations were made, which can only be accounted for, either by those lights burning much later, or by their being lighted earlier than the contract requires, or by escape during the day.

In one instance as much as 20 feet of gas passed through the meter between the time of extinguishing the light in the morning and lighting in the evening.

The quantity of light given at the public lamps

varies therefore considerably: and that variation is not only between different lamps, but at the same lamp at different periods of the night, and will account partially for the extreme differences of opinion, sometimes publicly stated, as to the efficiency or non-efficiency of the public lighting.

It having been reported to me that there was a manifest difference between the light afforded by those lamps having meters, and those without, and it having been likewise noticed by Dr. Letheby and myself, we have taken circuits of inspection, and found that it was very evident indeed, that such was the case both at lamps with and without carburators. Time, and the means at my disposal, have not yet permitted experiments to be made, to ascertain the exact consumption at lamps without meters; but the mean of a considerable number of rough observations taken by Dr. Letheby and myself, to ascertain the distance at which a given object was visible, showed that—

	STRENGTH OF LIGHT.	
	Without Meters.	With Meters.
	— Yards.	— Yards.
At lamps with carburators (3 cubic feet per hour, contract supply)	4·378	5·512
At lamps without carburators (5 cubic feet per hour, contract supply).....	4·758	5·925

These results show, with regard to the lamps fitted with carburators—that those with meters gave about 58 per cent. more light than those without meters.

And with regard to lamps without carburators, that those with meters gave about 55 per cent. more light than those without meters.

Also that the lamps with carburators and with meters, consuming nominally 3 cubic feet of gas per hour, gave superior light to lamps without meters burning nominally 5 cubic feet of gas per hour. And that the lamps with carburators gave less light than those without carburators, when compared under similar conditions in respect of meters.

These observations were 125 in number, and were made between the hours of 8.30 P.M. and midnight.

A very few observations only, as to pressure have been made; they were taken at different places, and are subjoined:—

Date. 1862.	Time.	SITUATION.	PRESSURE.								Gas Company supplying Lamps.
			Lamps.		With Carburetors.		Without Carburetors.		Outlet,		
			With Meter.	Without Meter.	Inlet.	Outlet.	Inlet.	Outlet,			
Oct. 8	11 P.M.	} No. 31, St. Paul's Church- yard.	..	Yes.	11-tenths.	11-tenths.	..	..	} Great Central.		
" 8	12 "		..	"	10 "	10 "	..	..			
" 9	1 A.M.		..	"	10 "	10 "	..	..			
" 9	2 "		..	"	10 "	10 "	..	..			
" 9	3 "		..	"	10 "	10 "	..	..			
" 9	4 "		..	"	11 "	11 "	..	..			
" 9	5 "		..	"	12 "	12 "	..	..			
Oct. 8	11.15 A.M.	} Opposite No. 26, St. Martin's-le- grand.	..	Yes.	10-tenths.	10-tenths.	..	..	} Great Central.		
" 8	12.15 "		..	"	9 "	9 "	..	..			
" 9	1.15 "		..	"	9 "	9 "	..	..			
" 9	2.15 "		..	"	11 "	11 "	..	..			
" 9	3.15 "		..	"	11 "	11 "	..	..			
" 9	4.15 "		..	"	12 "	12 "	..	..			
" 9	5.15 "		..	"	12 "	12 "	..	..			
Oct. 8	11.30 P.M.	} Opposite No. 10, Aldersgate Street.	..	Yes.	..	..	8-tenths.	..	} Chartered.		
" 9	12.30 A.M.		..	"	..	..	8 "	..			
" 9	1.30 "		..	"	..	..	8 "	..			
" 9	2.30 "		..	"	..	..	8 "	..			
" 9	3.30 "		..	"	..	..	8 "	..			
" 9	4.30 "		..	"	..	..	8 "	..			
" 9	5.30 "		..	"	..	..	8 "	..			
Oct. 10	11.5 P.M.	} Opposite No. 1, Princes Street.	..	Yes.	..	..	9-tenths.	..	} Chartered.		
" 12	12.5 A.M.		..	"	..	..	8 $\frac{1}{2}$ "	..			
" 11	1.5 "		..	"	..	..	7 "	..			
" 11	2.5 "		..	"	..	..	7 "	..			
" 11	3.5 "		..	"	..	..	7 "	..			

PUBLIC LAMPS.—REGISTER OF PRESSURES OF GAS—continued.

Date. 1862.	Time.	SITUATION.	PRESSURE.						Gas Company supplying Lamps.
			Lamps.		With Carburetors.		Without Carburetors.		
			With Meter.	Without Meter.	Inlet.	Outlet.	Inlet.	Outlet.	
Oct. 10	11.20 P.M.	{ Opposite No. 92, Cannon Street. }	..	Yes.	10-tenths. $9\frac{1}{2}$	10-tenths. $9\frac{1}{2}$	..	..	{ Great Central. }
" 11	12.20 A.M.		..	"	9	9	..	..	
" 11	1.20 "		..	"	9	9	..	..	
" 11	2.20 "		..	"	9	9	..	..	
" 11	3.20 "		..	"	9	9	..	..	
Oct. 10	11.40 P.M.	{ Corner of Laurence Pountney Lane. }	..	Yes.	8-tenths. 8	8-tenths. 8	..	..	{ Great Central. }
" 11	12.40 A.M.		..	"	7	7	..	..	
" 11	1.40 "		..	"	7	7	..	..	
" 11	2.40 "		..	"	7	7	..	..	
" 11	3.40 "		..	"	7	7	..	..	
Oct. 10	11.45 P.M.	{ Opposite No. 7, Crooked Lane. }	..	Yes.	10½-tenths. $10\frac{1}{2}$	10½-tenths. $10\frac{1}{2}$	..	..	{ Great Central. }
" 11	12.50 A.M.		..	"	10	10	..	..	
" 11	1.50 "		..	"	9	9	..	..	
" 11	2.50 "		..	"	9	9	..	..	
" 11	3.50 "		..	"	9	9	..	..	
Oct. 22	8 P.M.	{ Opposite No. 2, Walbrook. }	..	Yes.	..	..	..	14-tenths.	{ Chartered. }
" 22	9 "		..	"	..	..	..	13 "	
" 22	11 "		..	"	..	..	..	10 "	
Oct. 22	8.10 P.M.	{ Opposite Finch Lane, Threadneedle Street. }	..	Yes.	..	..	..	9-tenths.	{ Chartered. }
" 22	9.10 "		..	"	..	..	..	9 "	
" 22	11.10 "		..	"	..	..	..	7 "	
Oct. 22	8.15 P.M.	{ Opposite 14, Bishopsgate Street. }	..	Yes.	..	..	..	8-tenths.	{ Chartered. }
" 22	9.15 "		..	"	..	..	..	8 "	
" 22	11.15 "		..	"	..	..	..	6 "	

Oct. 22	8.20 P.M.	Opposite 132, Leadenhall Street.	..	Yes.	..	..	8-tenths. 7 " "	Chartered.
" 22	9.25 "		..	"	..	..	6 " "	
" 22	11.25 "		..	"	..	..		
Oct. 22	8.35 P.M.	Opposite Auction Mart, Bartholomew Lane.	..	Yes.	..	..	7-tenths. 7 " "	Chartered.
" 22	9.35 "		..	"	..	..	6 " "	
" 22	11.35 "		..	"	..	..		
Oct. 22	9.40 P.M.	Opposite 10, Moorgate Street.	..	Yes.	..	..	13-tenths. 13 " "	Chartered.
" 22	9.40 "		..	"	..	..	9 " "	
" 22	11.40 "		..	"	..	..		
Oct. 22	8.45 P.M.	Corner of Old Jewry.	..	Yes.	..	..	13-tenths. 13 " "	Chartered.
" 22	9.45 "		..	"	..	..	9 " "	
" 22	11.45 "		..	"	..	..		
Oct. 22	8.50 P.M.	Opposite Church Court, Old Jewry.	..	Yes.	..	..	13-tenths. 13 " "	Chartered.
" 22	9.50 "		..	"	..	..	9 " "	
" 22	11.50 "		..	"	..	..		
Oct. 12	6 P.M.	Opposite Mr. Keating's, Chemist, St. Paul's Churchyard.	..	Yes.	19-tenths. 19 " "	19-tenths. 19 " "	..	Great Central.
" 12	7 "		..	"	19 " "	19 " "	..	
" 12	8 "		..	"	19 " "	19 " "	..	
" 12	9 "		..	"	19 " "	19 " "	..	
Oct. 24	11 P.M.	Corner of Milk Street, Cheapside.	..	Yes.	..	9-tenths. 8 " "	..	Chartered.
" 25	12 "		..	"	..	8 " "	..	
" 25	1 A.M.		..	"	..	8 " "	..	
" 25	2 "		..	"	..	8 " "	..	
" 25	3 "		..	"	..	8 " "	..	
" 25	4 "		..	"	..	8 " "	..	
Oct. 24	11.30 P.M.	In Jewry Crescent.	..	Yes.	..	8-tenths. 6 " "	..	Chartered.
" 25	12.30 A.M.		..	"	..	6 " "	..	
" 25	1.30 "		..	"	..	6 " "	..	
" 25	2.30 "		..	"	..	6 " "	..	
" 25	3.30 "		..	"	..	6 " "	..	
" 25	4.30 "		..	"	..	6 " "	..	

From the foregoing it will be seen that,

	The Pressure had	
	A maximum of	A minimum of
In the district of the Great Central Gas Company ..	19-tenths	7-tenths
In the district of the Chartered Gas Company	14-tenths	6-tenths

The pressure has been taken between sunset and sunrise only.

It should be observed that in no case was there any loss of pressure by the application of the carburating apparatus.

I requested on behalf of the Commission, the co-operation of the police, which was at once afforded me by D. W. Harvey, Esq., the Commissioner of City Police, and I have been furnished by him each morning with an account of all the defective lights which were observed by the constables on the preceding night.

A list of the lamps having meters affixed, has also been furnished to the Commissioner of City Police, with the information that such lamps might be considered *as standards* by which the sufficiency of light given by the other lamps might be judged of by the police constables.

During the period over which these observations have been made, 133 complaints have been made by the police of defective lighting, an analysis of which gives:—

Lights not lighted	35
Ditto feeble	11
Ditto went out	87

The reports of the Gas Companies upon these complaints have not hitherto been made sufficiently in detail to enable me to give you a satisfactory account of the causes of defect.

I have, however, in all the cases, had examination made of the fittings and carburating apparatus, the result of which shows that, out of the 133 complaints—

In 89 cases no fault could be discovered in the carburator or fittings.

In 12 cases the apparatus was out of order, or wanting in a due supply of naphtha.

In 26 cases there were stoppages in the fittings.

These examinations were made in most cases after mid-day—the returns from the police only reaching my office about 10 a.m.—and I am unable to state whether or not, previously to the examination by my assistants, the companies had noticed these defects, and done anything to remedy them.

The stoppages in the fittings will, of course, account for the deficiency of light in the 26 cases where such stoppages were discovered; but with regard to the remaining 101 cases no positive reason can be alleged for the feebleness or extinction of the light. It is most probably attributable to the wind acting upon a reduced flame, but whether such reduction of flame is owing to the carburating apparatus (where they are affixed), or to the small amount of gas consuming at the actual moment of extinction is uncertain, although there appears to be nothing in the structure of the carburating apparatus which can possibly interfere with the issue of the gas, even if, in respect of quantity or quality of naphtha, the apparatus might be deficient.

There has not been a single instance of complaint of extinction, or feebleness of light, from any lamp to which a meter is affixed.

The total number of lamps in the City is 2,884.

The total number of complaints of light, during 52 days, was 133, this is at about the rate of 933 per annum, and there therefore is, upon the average, a defect to about $2\frac{1}{2}$ lights nightly out of 2,884 public lanterns.

With regard to the naphtha—specimens taken from the public lamps have been furnished to Dr.

Letheby, whose report upon that branch of the subject is subjoined.

In the foregoing pages, I have, I believe, drawn your attention to the whole of the important facts elicited by the experiments, and to those points that may be useful to you in considering the references made to you by the Commission.

And have the honour to remain,

GENTLEMEN,

Your obedient Servant,

W. HAYWOOD.

*Report by Dr. Letheby on the Quality of the Naphtha
supplied to the Carburators.*

Eighteen samples of the liquid from the carburators have been submitted to examination, and the following are the results:—

In three cases the liquid was water slightly tainted with the odour of naphtha.

In the other cases the liquid was a naphtha or petroleum of varying density from 888 to 840.

The boiling points ranged from 230 degrees of Fahrenheit to 280 degrees.

When tested in the carburators, by passing coal gas over the naphtha at the rate of three and a half cubic feet per hour, it was found that the proportion of hydro-carbon volatilised by the gas during the first twenty-four hours ranged from 1·43 grains per cubic foot to 4·73 grains, and that the increase in the illuminating power was from 6 to 24 per cent., but that this proportion rapidly declined.

The results, therefore, of this examination are—

1st. That in one-sixth of the cases there was no naphtha whatever, but merely water in the carburators; and

2nd. That in no instance was the naphtha of the quality necessary to give the desired increase of illuminating power to the gas; for I have already ascertained that the naphtha should give at least 6.5 grains of volatile hydro-carbon to each cubic foot of the gas to raise the illuminating power to the required standard of thirty per cent. above the ordinary quality.

That this can be accomplished without difficulty or uncertainty is manifest from the fact, that a gallon of the naphtha of proper strength will continuously supply about 6.5 grains of hydro-carbon to each cubic foot of 9,000 cubic feet of gas. Properly distributed, therefore, a gallon and a half or two gallons of good naphtha should be sufficient for a year's consumption of gas at each lamp.

At present, however, the supply is deficient both in quality and quantity, and the results are therefore unsatisfactory.

I have the honour to remain,

GENTLEMEN,

Your obedient Servant,

HY. LETHEBY.

Table of the Properties of Eighteen samples of Naphtha taken from the Carburetors at the Public Lamps in the City of London, in October, 1862.

Number of Sample.	Colour of Sample.	Specific Gravity. Water = 1000.	Boiling Point. (Fahr.)	Gives off Inflam- mable Vapour at (Fahr.)	Loss from Evapo- ration when ex- posed to air for 24 hours.	Amount yielded to each cubic foot of Gas.	Increase of Illuminating Power.
1..	Brown.	878	276	Degrees. 100	per cent. 4.8	1.43	6.3
2..	"	864	275	91	6.8		
3..	Amber.	1003	212	—	—		
4..	"	1002	212	—	—	2.62	12.0
5..	Brown.	893	275	104	4.0		
6..	"	884	268	98	4.6		
7..	"	841	256	80	5.9	4.73	24.0
8..	Amber.	840	230	60	10.2		
9..	"	1003	212	—	—		
10..	Brown.	880	266	96	5.8	7.8	
11..	"	884	273	100	5.7		
12..	"	888	280	99	5.9		
13..	"	826	220	60	10.2	7.9	
14..	"	838	237	81	8.8		
15..	Amber.	834	231	80	9.8		
16..	"	828	248	83	7.9	7.8	
17..	Brown.	870	256	80	6.9		
18..	"	862	257	80	7.8		

The samples Nos. 3, 4, and 9, were merely water coloured with Naphtha.

CONCLUSIONS.

We must, in the first place, beg to remark, that the results of these experiments, do not militate against the opinions we have before expressed of the conditions under which public lamps should be lighted; although, if they are taken without reference to other experience, they might lead in some respects to a somewhat different conclusion: and it must be said of them, that a far more varied and extensive series of observations, spread over a greater length of time, will be necessary before such observations as these can alone be made the basis of final and positive conclusions.

We have therefore, together, well considered the general results of the present inquiry in conjunction with the observations and reports made by us since the first experiment in carburating gas at the public lamps in Moorgate Street, in July 1860, to the present time, and are of the following opinion upon the various points now before the consideration of the Committee.

That, with the view to insuring the supply of the full amount of gas contracted for, we are of opinion

that it can only be effected in one of two ways, namely, either by the direct and nightly examination of the quantity of gas actually issuing from various burners, or by affixing a meter to each lamp. Both of these means will be attended with expense: the former with great expense, and also with somewhat uncertain results, inasmuch as averages would have to be relied upon; and we think the second method will be the least expensive and the most reliable. It is probable, also, that the rental of a meter to each lamp, if provided and maintained by contract, would not be a considerable annual charge; indeed, evidence has of late years been adduced, both actually and inferentially, to show that economy in the consumption of gas would in this way result; but above all, it would set at rest the doubts which now prevail in respect of the quantity of gas supplied to the lamps, and so far the adoption of the plan would be satisfactory.

Under such an arrangement the Commission should undertake the entire charge of their lamps—including the lighting and extinguishing the same. They can then call upon the companies to supply any given quantity of gas per hour to the public lamps, and will be enabled to adopt, without hindrance, any improvement in respect of burners or other contrivances that science or experience may hereafter suggest as a means of increasing

the power of the light, and economising the consumption of gas.

That as regards the carburating process at the public lamps, judging from the experiments made in Moorgate Street, and those which have been conducted elsewhere, we have no doubt whatever that it may be successfully applied if the proper amount of gas is afforded, and a due supply of naphtha, of a proper quality, is given; and that under these two conditions a considerable saving may be effected in the cost of public lighting; but it is of the utmost importance, as regards the success of the process, that more precise arrangements should be adopted for the maintenance of the proper quantity and quality of naphtha in the carburators than have hitherto existed.

We have the honour to remain,

GENTLEMEN,

Your obedient Servants,

WILLIAM HAYWOOD,

Engineer.

HY. LETHEBY,

Medical Officer of Health.

PS.—Copies of other Reports upon the Carburating Process are appended.

APPENDIX.

REPORT

UPON THE

CARBURATION OF GAS,

AS SUPPLIED TO THE

PUBLIC GAS LAMPS,

BY THE PROCESS OF THE

UNITED KINGDOM CARBURATING GAS COMPANY.

TO THE HONOURABLE THE COMMISSIONERS OF
SEWERS OF THE CITY OF LONDON.

SEWERS' OFFICE, GUILDHALL,
30th July, 1861.

GENTLEMEN,

I beg to report, that in pursuance of the resolution of the Court of the 23rd April last, I have directed an experiment with the view of testing the value of the application to the public lamps, of the process patented by the United Kingdom Carburing Gas Company.

The patent of this Company is for placing near to the gas burners a receptacle containing coal

naphtha, the gas passing through or over this, takes up, and becomes enriched by the addition of the volatile hydro-carbons contained in the naphtha, and the illuminating power of the gas is thereby increased; the quality of the naphtha employed determines mainly the degree of illuminating power gained, and the chemical and photometrical experiments laid before me show that it varies from 25 per cent. to 77 per cent.

The experiment being one in which the Gas Companies are much interested, I applied to the Chartered Company, who light Moorgate Street, suggesting their co-operation in conducting it with me, the suggestion was at once acceded to, and their Inspector, Mr. Johnson, was placed in communication with me for that purpose.

Moorgate Street was selected as well adapted for the experiment, there being an equal number of lamps upon each side of the way, but one or two private lamps only in the street, and but few shops; the street is, therefore after an early hour of the evening almost entirely without artificial light, excepting that which it derives from the public gas lights.

The patentees stating, that by the application of their process equal light would be given, with half the ordinary consumption of gas; the burners were regulated accordingly.

The lamps experimented upon were twelve in

number, six upon the western side which were fitted with the ordinary batwing burners calculated to consume upon the average of the night 5 cubic feet of gas per hour, and six upon the eastern side fitted with batwing burners calculated to consume $2\frac{1}{2}$ cubic feet per hour. The latter burners having attached to them the carburating apparatus of the Company, each of the twelve burners had a meter attached to it, to ascertain the actual consumption. No pressure regulators were fixed upon the lamps.

The registration commenced upon the 19 of June, and terminated upon the 19th of July inst., the experiment extending therefore over thirty nights, and gave the following results.

That the burners without the carburating apparatus consumed about 4.39 cubic feet per hour.

That the burners fitted up with the carburating apparatus consumed 2.09 cubic feet per hour.

No photometer was employed, the equalisation of the amount of light given by the two classes of burners was a matter of judgment. The District Inspector of the Commission, who saw the lights nightly, reports his opinion that the light given was perfectly equal, and that his opinion is strengthened by collecting those of certain residents in the neighbourhood. My own opinion is that the light of the $2\frac{1}{2}$ foot burners was upon the

average of the month inferior, although but very slightly so, to that of the 5 feet burners. The Inspector of the Chartered Company coincides with me in this.

No chemical analysis was made of the naphtha used; but it is stated by the patentees to have been of the best quality.

My deduction from the experiment is, that with naphtha of equal quality to that used, that during the warm months of the year 3 cubic feet of carburated gas may be considered as about equal to 5 cubic feet of gas not carburated.

Assuming this to be data applicable to all seasons of the year, I have estimated the saving to be effected by the process, and after allowing for the cost of the apparatus, and for periodically filling it with naphtha, and after giving credit at the present price of the gas supplied to the public lamps for the quantity not consumed, it shows that the reduction in the cost of each public lamp will be at least £1 per annum; and there being 2,825 lamps within the City, that a saving of about £2,825 would be annually effected.

The only disadvantage observed during the experiment was that the reservoir as constructed, throws a disk of shadow round the base of the gas lamp standard, but the depth of shadow is but slight; this disadvantage may be largely rectified by an alteration in the form of apparatus.

It should be understood that I do not pledge myself to any of these figures as exact, for the experiment as conducted cannot lay claim to be considered minute or exact in its character; but I believe it may, nevertheless, be taken as giving a close approximation to the truth; it is the mean of the rough results of practice, and the refined processes of the laboratory from which reliable data are generally drawn; in this case the results of the experiment are supported by laboratory experiments, and consequently there seems but little doubt that this *mode* of applying naphtha to the public lights (for the naphthalisation of gas itself is by no means new), may lead to a considerable reduction in the cost of public lighting; but what that reduction ultimately would be, would depend upon points which can only be determined by the application of the process to a considerable number of lamps for some length of time, and at different seasons.

I have the honour to remain,

GENTLEMEN,

Your most obedient Servant,

WILLIAM HAYWOOD,

Engineer.

Memorandum by Dr. Letheby upon the Carburating Apparatus, and the Naphthalisation of Gas at the Public Lamps.

The apparatus consists of a chamber for holding coal naphtha, and of a contrivance for directing the stream of gas over the surface of the naphtha. By this means the gas becomes charged with volatile hydro-carbons, and acquires a higher illuminating power.

Three sets of experiments were made for the purpose of determining the value of the apparatus. In the first set a naphtha rich in benzole was employed, and the results were, that at first it raised the illuminating power of ordinary *twelve-candle* gas to *twenty-four* candles, and in the course of three days the power fell to eighteen candles, the mean of the whole being twenty-one candles. This is an increase of 77 *per cent.*, and it was effected by giving 10·77 grains of naphtha vapour to each cubic foot of gas.

In both of the other sets of experiments an inferior kind of naphtha was used, and in one case the average increase of illuminating power, during a period of ten days, and after the passage of a thousand cubic feet of gas, was 25 *per cent.* In the other case, after a duration of five days, the average increase was 30 *per cent.* The former was

effected by the addition of four grains of naphtha vapour to each cubic foot of gas, and the latter by 6.56 grains.

These data are sufficient to indicate the general capabilities of the apparatus, for they show that with a good naphtha, supplied in proper quantity, and furnishing from ten to eleven grains of vapour to each cubic foot of gas, the illuminating power of an inferior gas may be NEARLY DOUBLED. A less volatile naphtha, giving only from four to seven grains of vapour per cubic foot, will increase the power of twelve-candle gas from 25 to 30 per cent. I am, therefore, of opinion, that the apparatus is of practical value as a carburetting agent, and that if supplied with good naphtha, in proper quantity, there will be no difficulty in sustaining a power of *twenty candles* with ordinary coal gas.

(Signed)

HY. LETHEBY, M.B., M.A., Ph.D.,

*And Professor of Chemistry in the College of the
London Hospital, and Chemical Referee in the
matter of Gas Supply to the Corporation of London.*

COLLEGE LABORATORY,

LONDON HOSPITAL,

February 4th, 1861.

REPORT
TO THE
HON. THE COMMISSIONERS OF SEWERS
OF THE
CITY OF LONDON,
UPON SOME OF THE
CONDITIONS FOR LIGHTING
THE
PUBLIC LAMPS.

BY
WILLIAM HAYWOOD, M. INST. C.E., F.R.I.B.A.,
ENGINEER AND SURVEYOR TO THE COMMISSION.

DECEMBER THE 15TH, 1862.

LONDON:
PRINTED BY M. LOWNDS, 148 $\frac{1}{2}$, FENCHURCH STREET, E.C.
1862.

*At a Meeting of the Commissioners of Sewers
of the City of London, held at the Guild-
hall of the said City, on Monday, the
15th December, 1862.*

The Engineer laid before the Court the following
Report.

RECEIVED AND ORDERED—

That the same be printed, and circulated among
the Members of this Commission.

JOSEPH DAW,

Principal Clerk.

REPORT

TO

THE HON. THE COMMISSIONERS OF SEWERS
OF THE CITY OF LONDON,

UPON SOME OF THE

CONDITIONS FOR LIGHTING THE PUBLIC LAMPS.

TO THE HONOURABLE THE COMMISSIONERS OF
SEWERS OF THE CITY OF LONDON.

SEWERS' OFFICE, GUILDHALL,
15th December, 1862.

PUBLIC LIGHTING.

GENTLEMEN,

I beg to submit to you the following observations upon the subject this day under your consideration.

There were two principal points of reference made by the Gas Committee to Dr. Letheby and myself to report upon.

1st. As to the best means to be adopted for ensuring the full supply of gas to the public lamps.

2nd. As to the possibility of effectually carburating the gas at the public lamps.

The first reference appears to have arisen out of the complaints made of defective public lighting within the City during the last few years; and probably in a degree to the attention drawn to the subject generally by the inquiries into the gas supply of the Metropolis, before the Committee of the House of Commons, during the recent sessions.

To this reference Dr. Letheby and myself, upon the 30th May last stated our opinion, that affixing meters was practically the best way of ensuring that the gas contracted for was supplied.

When we recommended meters, we did not state that the proper quantity of gas was not given. Indeed we had no positive material to enable us to do so.

At the beginning of August, we, at the direction of the Commission, undertook to examine into the matter, and reported to you on the 2nd November last. The evidence we obtained upon the con-

sumption of gas indicated that where meters were used, the Great Central Company were giving more gas than was required by contract, and the Chartered Company were giving less than the contract quantity. (Page 7.)

The difference between the light given by lamps with and without meters, was, however, so manifest to ordinary or casual observation, that we took some observations of a rough character to verify our impression, and the results were: that in the Great Central District the lamps without meters appeared to give 58 per cent. less light than those with meters; and in the Chartered District 55 per cent. less light than those with meters. (Page 10.)

We were not of opinion that meters were essential to each lamp, but the Gas Companies insisted upon that being so, if the Commission burnt gas by meter and lighted and took charge of their own lamps.

The Commission, then, upon consideration of all the circumstances, resolved to burn by meter; to affix a meter to each lamp, and assume the charge of lighting, cleaning, &c.

Since the presentation of the Report referred to, a few special observations have been made by my

direction of the rate of consumption at the lamps without meters, and the results are as follows:—

In the GREAT CENTRAL DISTRICT—

			Per hour.
The mean of 5 feeble lights in Farringdon Street,			2·88
„ 25 lights, being the whole number in			
Fleet Street	„		2·55
„ 10 „ in Skinner Street	„		2·86
„ 4 „ in Snow Hill ..	„		2·61
„ 2 „ in Well Court ..	„		2·94
„ 2 „ in Bucklersbury .	„		2·26
„ 19 from Queen Street to Addle Hill,			
Upper Thames Street	„		2·63
The average being			2·64

In the CHARTERED DISTRICT—

			Per hour.
The mean of 4 feeble lights in Aldersgate Street,			2·94
„ 8 „ in Bishopsgate Street	„		3·41
„ 1 „ in New Broad Street	„		3·09
„ 1 „ in Liverpool Street..	„		3·00
„ 6 lights, the whole of Little Moorfields	„		3·00
„ 4 „ of Princes Street ..	„		3·93
„ 5 „ of Cornhill	„		3·76
„ 8 „ of Leadenhall Street.	„		4·00
„ 14 „ of Moorgate Street..	„		4·15
The average being			3·76

Now assuming the mean of the observations made in whole streets to give a fair average of the

districts, they show that by the Great Central Company 12 per cent. less gas is given than is contracted for, and 25 per cent. less gas is given by the Chartered Gas Company than is contracted for.

In the evidence given by Mr. Hughes (a Civil Engineer) before the Committee upon the Metropolis Gas Bill, 1860, it is stated that the results of experiments made by him upon lamps in eight different districts of the Metropolis, the lamps being 106 in number, showed that 30 per cent. less gas was given than was contracted and paid for.

On the other hand, it was stated by the London Gas Light Company that the results of observations by meter made in six parishes of London, showed that upon the average 8·80 per cent. more gas was supplied by them than was contracted for.

Mr. Arntz also, the Surveyor to the Local Board of Westminster, made, in the year 1858, an investigation into the quantity of gas supplied by the three Companies lighting the public lights in that district, and the result was, that so much less gas appeared to be supplied than was contracted for, that £2021. 6s. 1d. was being paid annually for gas above the proper amount. This calculation of loss was supplied by Mr. Hughes, who was a member of the Westminster Board.

These statements are startling by their wide difference, and can only increase the doubt and uncertainty upon the point: burning the gas by meters, which under the joint supervision of the supplier and the consumer cannot fail to give a true result, will alone set those doubts at rest; and it is a system which ought to be as satisfactory to the Gas Companies as to the Commission.

Until within the last few years there has been no supervision of any importance of the public lighting. The supply, and all that had reference thereto, excepting the cleaning and painting of the lanterns being left to the good faith of the Companies; a condition of things which would scarcely be allowed to exist with regard to other contracts of equal magnitude. About two and a half years ago, there being then much complaint of defective light, the Commission obtained the partial co-operation of the Police, who have since reported the cases of every evident defect; the Companies have there upon made their statement of the cause of

NOTE.—Whatever system the Commission may be pleased to adopt in future with regard to the public lighting, I submit that an Inspector or other officer, whose sole duty it should be to supervise the public lighting, should be appointed. The proper discharge of his duties would occupy the whole of his time, and require him frequently to be out a large portion of the night: the earnest co-operation of the Police should also be had if possible.—W. H.

the defect, and there the matter has rested, no officer of the Commission having investigated the matter, and indeed, no officer has been appointed to do so.

It is stated that the gas is consumed by meter at the public lamps at Leicester, Lincoln, St. Ives, Worthing, Torquay, and other places; that it is almost universal in Scotland, and that the system is considered to be economical and satisfactory.

Whether or not saving will be effected by having the meters and taking the entire charge of the lighting and cleansing remains to be seen; there are certainly grounds for anticipating that there will be; upon that point, however, I have given no positive opinion. I can only state that for the Commission to have possession of the columns, lamps, and pipes, to take charge of the lighting, cleaning, and repairs, and to burn by meter, appears to be the fairest and most correct principle of carrying out the public lighting, and the one which can alone in the present day be satisfactory. And it is moreover the only one which will leave the Commission unfettered should it desire from time to time to try experiments, or avail itself of the improvements which science may develop.

As to fixing the meters. There are three modes which can be adopted.

1st. To fix them upon the brackets of the lamps projecting from the wall, and upon the ladder irons of the lamp posts.

2nd. To fix them in wells or pits beneath the ground which must be constructed for the purpose.

3rd. Where there are columns, to fix them in the bases or lower portions of the posts, which would have to be new and be specially designed for the purpose.

Of the three modes the first is the cheapest. When fixed upon the brackets, and close against the walls of the houses, they will scarcely be noticed ; those upon the ladder irons will not, it is true, be sightly, but most of the lamps, columns, and indeed, everything appertaining to the public lighting in the City, and nearly the whole of the Metropolis, is certainly not handsome, and the addition of the meters will not make them appreciably less so, or appreciably more ugly than they now are.

The second mode is, however, in most respects the best, and the position of the meter will in such situations define precisely where the pipage of the Commission begins, and where that of the Company ends ; but it will cost about £1 per lamp in addition to the cost of the meter.

It might be adopted to the lamp columns only, of which there are but about 800 in the whole City, and 529 in the district of the Great Central Gas Company, and the other meters might for the present be placed upon the brackets close to the walls of the houses.

It would be very desirable to have new gas columns and also lanterns of a handsomer and improved description; the whole of the present lanterns are very old and in a most indifferent condition; the bases of the new columns might be designed so as to contain the meters, but some months would elapse before they could be designed, cast, and fixed.

If this were carried out, it would be most economical to begin with a few of the important thoroughfares, fix the new columns there, putting the old in stock to be used up in the second class streets and places; proceeding thus gradually, the expense would be distributed over a few years.

And should the carburation be made successful, the design of the lamp might be made to screen the apparatus, the appearance of which is objected to by some, as well as to diminish the shadow cast by them, but all these changes will take some time to consider, mature, and effect.

THE CARBURATING PROCESS is a question which should be independent of that of the meters; although the process never can be fairly tested, unless the full supply of gas is given which is calculated upon, and burning by meter is the way of ensuring the full supply.

Dr. Letheby and I were of opinion, that with due care the process must be successful, and lead to a considerable pecuniary saving; but what that saving will actually be will depend greatly upon the cost at which the Companies supply gas; whether they will continue the prices they have charged in former years, or ultimately charge the 4s. 6d. per thousand cubic feet which the Metropolis Gas Act authorises them to do, remains to be seen. The Metropolitan Companies have advanced reasons why the gas supplied to public lamps should not be at a cheaper rate than to a private consumer, and this leads to the inference that at no distant date the maximum price will have to be paid by public boards.

With gas at 4s. per 1,000 cubic feet, the following appears to be the probable saving which will be effected.

WITHOUT CARBURATORS.

	£.	s.	d.	£.	s.	d.
22,000 cubic feet, at 4s.	4	8	0			
Lighting, cleaning, and repairs	0	15	0			
Cost per lamp per annum				5	3	0

WITH CARBURATORS.

	£.	s.	d.	£.	s.	d.
Say 13,000 cubic feet, at 4s.	2	12	0			
Lighting, cleaning, and repairs	0	14	0			
Filling carburators.	0	3	6			
Naphtha	0	8	0			
Royalty	0	6	0			
Cost per lamp per annum				4	3	6
Saving per lamp per annum				£0	19	6

Estimating upon the same basis with gas at 3s. 6d. per thousand feet, the saving will be 15s. 0d. per lamp per annum.

At 3s. 9d.	„	17s. 3d.	„
At 4s. 3d.	„	21s. 9d.	„
At 4s. 6d.	„	24s. 0d.	„

The higher therefore the price of the gas, the greater will be the saving that may be expected from the adoption of the carburating process, and it may be added, the higher the price of gas the more important it seems that the delivery of the full supply of gas should be obtained.

The saving which may be obtained will, in a degree, depend also upon the cost of the naphtha ;

that specified for the future contract is of a superior quality, and may cost somewhat more than I have estimated ; but with the sole control of the lighting in its hands, the Commission can at a future day regulate this, it can modify the standard of the naphtha, and increase in any degree it may think proper the quantity of gas to be consumed ; if 3 cubic feet naphthalised does not afford sufficient light, $3\frac{1}{2}$ cubic feet may ; but any other quantity can be used, the lights may be increased in strength during the winter months, and diminished during the summer months, the whole can, in brief, be regulated at the discretion of the Commission alone.

On the other hand, the recent discovery of *hydrocarbons* gives fair grounds for expectation that a supply of one fitted for the purposes of the Commission may be had at a reasonable price should that of the specified naphtha be found to be too costly.

One thing should be remembered, if after a few months' trial of the process by the Commission, when it has the entire management of the street lighting in its hands, it should be considered unsuccessful the whole of the apparatus can be removed, and the usual 5-feet burners be replaced within a week, and only the gas consumed will be paid for, and this change can be effected without

negotiation or trouble with, and indeed almost without reference to the gas companies.

It is needless to trouble the Commission with observations upon the probable causes of the complaints which have been made about the carburating process, but it may be remarked, that police complaints have not been numerous, and that those from the public have been but five in number, and two of which were from the same district; and the statements of the Gas Company, and Carburating Company have, at the different conferences held with them by the Special Committee upon gas, been so conflicting, as to render it very difficult to draw sound conclusions from them; but all circumstances tend to show, that unless the Commission has the sole control both of the gas and the carburation the process is not likely to be satisfactory.

I have the honour to remain,

GENTLEMEN,

Your obedient Servant,

WILLIAM HAYWOOD,

Engineer and Surveyor.

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*At a Meeting of the Commissioners of
Sewers of the City of London, held
at the Guildhall of the said City on
Tuesday, the 20th January, 1863—*

HENRY DE JERSEY, Esq., DEPUTY, IN THE CHAIR.

The Report of the Improvement Committee, dated this day, was read, and the following extract therefrom was ordered to be printed and circulated among the members of the Commission, together with the Engineer's Report thereunto annexed, and the further consideration thereof was adjourned:—

“ On the subject of the Subway Crossing proposed by Mr. Newton, to be formed across the west end of Ludgate Hill, from Farringdon Street to New Bridge Street, we have heard Mr. Newton, in explanation of his views, and have carefully considered the same.

“ We deemed it right to refer the whole question to your Surveyor to consider, and give his opinion as to its practicability. And having received from him a Report which fully enters into the question, we beg to lay the same before you; and under the circumstances of the case we recommend that no further steps be taken in the matter.”

JOSEPH DAW,

Principal Clerk.

TO THE HONOURABLE THE COMMITTEE UPON
IMPROVEMENTS, OF THE COMMISSIONERS OF SEWERS
OF THE CITY OF LONDON,

SEWERS' OFFICE, GUILDHALL,

19th January, 1863.

GENTLEMEN,

I beg to report that I have considered the Plan of Mr. Newton, for forming a Subway beneath the Junction of Fleet Street and Ludgate Hill with inclines leading thereto, so as to enable the traffic, going from Holborn to Blackfriars Bridge and from Blackfriars Bridge to Holborn, to pass without mixing with the traffic going east and west, which would by the plan proposed, pass over that going north and south.

As a scheme, this Incline and Subway is perfectly practicable ; but it would involve re-building a large portion of the Fleet Sewer, the re-laying of considerable lengths of gas and water pipes, the curtailing the widths of the footway pavements in portions of New Bridge Street, and the purchase of certain portions of the open areas in the fronts of

the houses in the same street, and setting back the railings which enclose them.

I have consulted with Mr. Bazalgette, the Engineer of the Metropolitan Board of Works, upon the question of the Fleet Sewer, who is not prepared to advise any reduction in its size, although he sees no objection to its diversion and reconstruction.

Under any circumstances, the construction of the Subway would be a matter of the extremest risk and difficulty, until the low level intercepting Sewer is built; and even then, the nature of the soil, the importance of the Sewer beneath it, the traffic, and other circumstances, would concur to make the work a matter of much difficulty and expense. I estimate the cost approximately at £20,000.

The gradients of the Subway must be about 1 in 25, a gradient which cannot be pronounced unsafe, but which is certainly not a desirable one, nor likely to induce the drivers of heavily laden vehicles to use it if it could be avoided: it would require, therefore, Police agency to enforce the usage of the Incline and Subway.

If the gradient were reduced, the Incline must

begin higher up than Fleet Lane on the north, and lower down than Tudor Street on the south, which would be very objectionable.

Its execution would occupy about nine months, and during much of that time the traffic would have to be to a large extent, although not entirely, stopped; for a period of one or two months, it seems to me, that the traffic going east and west must be entirely diverted from its present channel.

Upon the whole, it is questionable whether £20,000 could not be more advantageously expended in the purchase of the corner houses at the spot in question, and the formation of a circus; by which means the convenient passage of vehicles would (looking at all contingencies) be best provided for. And it may be mentioned that there seems a probability of the whole of the property at the south-end of Ludgate Hill being removed as it is now scheduled by the promoters of the Ludgate Station and Junction Railway Company.

I have the honour to remain,

GENTLEMEN,

Your most obedient Servant,

WILLIAM HAYWOOD,

Engineer.

*At a Meeting of the Commissioners of
Sewers of the City of London, held
at the Guildhall, of the said City, on
Tuesday, the 20th January, 1863—*

HENRY DE JERSEY, Esq., DEPUTY, IN THE CHAIR.

The Report of the General Purposes Committee, dated this day, was read, and it was ordered that the following extract therefrom be printed and circulated among the members of the Commission, together with a copy of the Engineer's Report thereunto annexed, and the further consideration thereof was adjourned:—

“On the reference of the 18th November last, respecting Street Tablets, reported on by your Inspectors, and on the Memorial of certain citizens, that they may be allowed to retain the same, we have had laid before us a Report from your Surveyor, with the recommendations contained in which, we agree, and we recommend to your Honourable Court, that such Report should be printed and circulated among the Members of your Honourable Court.”

JOSEPH DAW,

Principal Clerk.

TO THE HONOURABLE THE COMMITTEE UPON
GENERAL PURPOSES OF THE COMMISSIONERS OF
SEWERS OF THE CITY OF LONDON.

SEWERS' OFFICE, GUILDHALL,
19th January, 1863.

GENTLEMEN,

I beg to report in reference to the projection of small sign-boards over the public ways, that having given the subject my most careful consideration, I am of opinion that they should not be suffered to remain anywhere within your jurisdiction.

These boards vary from 10 inches by 7 inches to larger dimensions, and from 5 feet 5 inches to 10 feet in height to their underside above the street pavements, and it cannot be doubted that they render the public way less commodious; inasmuch, as a tall man, or persons with umbrellas, or men carrying loads, would be impeded by most of them, and that they are otherwise objectionable in obstructing light and air.

It must be borne in mind that these sign-boards

are not to enable premises to be conveniently or comfortably occupied; they are not essential to the full enjoyment of property, and differ therefore entirely from coal-plates, area-gratings, cellar-flaps, and similar conveniences, which are by long custom universally employed and permitted, although it cannot be doubted that even they, in a degree, cause public inconvenience. The boards in question, are a form of cheap advertisement, and nothing more; a gain, or supposed gain, to him who erects them, and an annoyance to his neighbour, who does not want them. Their sole value, even if they have any, is in their rarity; for they would cease to be desired, if every tradesman was to put one out, although it might be difficult to make tradesmen believe this; but their multiplication to any extent would constitute an aggravated nuisance, and greatly disfigure the streets.

When the Commission allowed, in certain cases, reflectors to be affixed, it was to enable the interior of premises in confined situations, and where there was but little traffic, to be rendered lighter and healthier; but within a short time afterwards, similar reflectors were erected in the most important thoroughfares: they were made, in many cases, advertising boards, and, I believe, have frequently been erected for no other purpose, although the ostensible one was to obtain increased light. It

seems, indeed, to be the nature of these concessions, to stimulate persons to encroach further upon the rules and regulations established for their limitation; and the encroachments are mostly made by almost imperceptible degrees and slight gradations, so that it is oftentimes extremely difficult to refuse sanction to them; and there is but little doubt, that if these sign-boards are once permitted, the greatest difficulty will be experienced in keeping them within any limits which might be prescribed; and, indeed, it might be difficult to affirm that 13 inches was a nuisance if 12 inches was not, or that $13\frac{1}{2}$ inches was objectionable, if 13 inches was allowed; but such infringement of the rules of the Commission would nevertheless lead to great public nuisance, and the exercise of the power of suppression might be one of great difficulty, even if that power should rest with the Commission.

A regulation with some semblance of reason to support it, might be framed to determine the height of these sign-boards above the public way; but, as regards size and number, it seems to me it would be impossible otherwise than by a mere arbitrary rule to limit them; and, if once permitted, there might in a short space of time be seen boards projecting from all parts of the houses, for every occupant of an office or a room would expect the privilege of having one, if he needed it; and a

speculative advertising agent might project one from each window of a house, and it would be very difficult to show why he should not be permitted to do so, as it might be alleged that inconvenience to the public would diminish as the projection increased in height above the public way.

Therefore, believing these sign-boards to be in themselves a nuisance, and likely, if permitted, to establish a precedent of a most inconvenient kind, I recommend the Commission in all cases to refuse its sanction to their being placed over the public ways.

I have the honour to remain,

GENTLEMEN,

Your most obedient Servant,

WM. HAYWOOD,

Engineer and Surveyor.

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REPORT

TO THE

HON. THE COMMISSIONERS OF SEWERS

OF THE

CITY OF LONDON

UPON THE

RAILWAY

AND OTHER COMPANIES, APPLYING FOR POWERS TO CON-
STRUCT WORKS WITHIN THE CITY OF LONDON.

BY

WILLIAM HAYWOOD, M. INST. C.E., F.R.I.B.A.

ENGINEER & SURVEYOR TO THE COMMISSIONERS.

27th January, 1863.

LONDON:

PRINTED BY M. LOWNDS, 148½, FENCHURCH STREET, E.C

1863.

*At a Meeting of the Commissioners of
Sewers of the City of London, at
the Guildhall on Tuesday, January
27th, 1863.*

The Report of the Surveyor, hereunto annexed,
being read,

IT WAS ORDERED—

That the same be Printed, and a copy be sent
to every Member of the Court.

JOSEPH DAW,

Principal Clerk.

REPORT

UPON THE

RAILWAY AND OTHER COMPANIES, APPLYING
FOR POWERS TO CONSTRUCT WORKS

WITHIN THE

CITY OF LONDON.

TO THE HONOURABLE THE COMMISSIONERS OF
SEWERS OF THE CITY OF LONDON.

SEWERS' OFFICE, GUILDHALL,
27th January, 1863.

GENTLEMEN,

I beg to report that I have made general examination of the Plans of the various Railway and other Companies, and of the various other Bodies which seek powers during the ensuing Session of Parliament, to enter, and execute works within the City of London.

The projects are as follows:—

1. Ludgate Station and Junction Railways Bill.
2. London, Chatham, and Dover Railway Bill.
3. Metropolitan Railway Bill.

4. Great Eastern Railway Bill (New Metropolitan Station and Branches).
5. Metropolitan Bridges Bill.
6. Blackfriars Bridge Bill.
7. Thames Embankment—New Street from Blackfriars Bridge to the Mansion House Bill.

THE LUDGATE STATION AND JUNCTION RAILWAYS BILL.

This is to form a Company with power to make a Central Railway Station somewhere between Earl Street and Skinner Street, in the City of London, with Junction Railways to connect the London, Chatham, and Dover Railway and the Metropolitan Railway; and also a Railway to connect with the New Smithfield Market.

The property scheduled begins from the northern side of Earl Street, and is bounded on the west by a line 10 feet from the eastern side of New Bridge Street, which runs along that street, Farringdon Street, and Victoria Street to the City boundary. At the northern boundary of the City, the property as far back as to Fox and Knot Court and King Street, Smithfield, is taken; the eastern boundary of the property scheduled from thence to Earl Street has an angular outline, the width of which measuring from the western boundary, varies

from 200 to 300 feet. The total area scheduled is about $17\frac{1}{2}$ acres, of which the area of public ways is about $3\frac{1}{2}$ acres.

Fleet Lane is to be stopped up. Water Lane and the streets leading from it into New Bridge Street are to be arched over.

Earl Street is to be passed over by a girder bridge 16 feet high, and Ludgate Hill by a girder bridge 18 feet high; these are the same heights as were arranged by the Commission with the London, Chatham, and Dover Railway Company in 1860.

Neither the details of the station, nor its exact position are yet determined. I am unable, therefore, to give further information respecting it. But to enable the Commission fairly to judge of the effect it may have upon the adjacent traffic, and the alterations which might be required in the public way to meet it, some plan, showing the general principles of the station should, I think, be submitted and agreed to before the Bill has the approval of the Commission.

If this Bill passes into law, the London, Chatham, and Dover Railway Company is to construct its line up to Earl Street only. The Metropolitan Railway is to stop at Victoria Street, and the Lud-

gate Station Company will construct the station and the connecting lines between them. The powers of the London, Chatham, and Dover Railway Company for taking the land in the City, expire on the 6th August, 1863.

It appears to be most probable, that a large portion of the property at the western end of Ludgate Hill will be taken down, which will present a favourable opportunity of widening that important thoroughfare at its junction with Farringdon Street and New Bridge Street; whether arrangements can shortly be entered into for carrying out such an improvement simultaneously with the construction of the railway, cannot of course now be stated, but the railway company should certainly be required to cross Ludgate Hill with a bridge of such a span, as will not interfere with the widening of the street at any future time; and a plan for that widening should at once be prepared.

It would also be expedient for the Commission to communicate with the Metropolitan Board of Works in relation to the matter forthwith, as it will afford that Board such an opportunity for effecting a large public improvement as may not occur again.

THE LONDON, CHATHAM, AND DOVER
RAILWAY COMPANY'S BILL.

The existing powers of this Company for completing the purchase of property within the City of London, from the Thames to the south side of Earl Street, which expire at August next ensuing, are sought to be extended until the 1st August, 1865 ; but the power the Company now possesses of taking ground up to Skinner Street will be allowed to lapse, the Junction Railways Company being permitted as before said, to take that ground and form the continuation of the Railway: the time given for the completion of this line is also sought to be extended until 1st August, 1867.

This is the only point directly affecting the City, but the Company seeks power to construct numerous branch lines within the southern suburbs which cannot fail to be of great convenience to the public, as forming part of that general scheme of Metropolitan Railway communication which must ultimately be carried out in some shape. The principal point to be aimed at being that all such railways should be placed in direct inter-communication with other railways within the Metropolis.

THE METROPOLITAN RAILWAY BILL.

This Bill is to empower the Company to take additional land upon various points of the line of the proposed Railway; within the City this additional land lies between Little Moorfields and White Cross Street.

The area scheduled is 1a. 2r. 29p.

The Company also seek powers to extend the time for the purchase of lands which it now possesses under various Acts for a period of three years from the ensuing Session of Parliament. There are other Clauses which do not appear to affect the City directly, nor to affect it in any way injuriously.

THE GREAT EASTERN RAILWAY—NEW METROPOLITAN STATION AND BRANCHES BILL

Is to empower the Company to make certain Branches in the eastern portion of the Metropolis also, and pass *over* the City Extension of the North London Railway which was authorised in 1860, and the Terminus of which is to be in Liverpool Street, Bishopsgate Street.

The proposed Railway is to cross by a viaduct over the North London Railway at or about

Worship Street, Shoreditch,—it then proceeds on the Western side of that Railway and nearly parallel to it, touching the City area for a short distance at Primrose Street and Skinner Street only, thence running outside the City Boundary nearly parallel to Long Alley, it crosses Eldon Street and enters Finsbury Circus.

It is to be built upon a Viaduct, the level of the rails at Eldon Street being 18 feet, and at London Wall 19 feet above the present Street levels.

The area scheduled within the City is bounded on the North by Eldon Street, South by London Wall, East by Finsbury Pavement, and West by Blomfield Street. From which area four chapels and the Eye Infirmary at the North corner of Blomfield Street are alone excepted. The total area scheduled being 9a. 3r. 37p.

This Bill requires the most careful consideration of the Commission.

A complete railway system for the Metropolis might once have been so arranged, that a station was within half or three-quarters of a mile of every house, and that a passenger going to any one station could proceed to any part of London without leaving the railway until he arrived at the

station nearest to his destination. Constructed as many lines of Railway now are, or are authorised to be made, the full general benefit which might have been gained by such a system, is unfortunately lost; but there can be no reason why the principle, if a sound one, should not be held steadfastly in view with regard to all future lines.

The Metropolitan Railway which has just been successfully completed is intended to be extended up to Finsbury Pavement. An Act of Parliament having been already obtained for that purpose; the level of the rails at the terminus will be 18 feet 6 inches *below* the surface level; whilst the Great Eastern Extension, as now proposed, will have the level of the rails 19 feet *above* the surface level; and the surface near both termini being at about the same level, there will therefore be about 37 feet 6 inches difference between the levels of the two railways.

The Metropolitan Railway will within the course of a few years be joined on to the London, Chatham, and Dover Line; a line which has many Metropolitan stations, and probably will have still more. These railways, therefore, will enable the inhabitants of the Metropolis to cross from north to south with a celerity and comfort at present unknown to them. They may be expected materially

to relieve some lines of streets of the present traffic, and will undoubtedly prevent that traffic from increasing at the present rate, which bids fair in a short time to make some of the main streets of the Metropolis all but impassable.

The Metropolitan, and portion of the London, Chatham, and Dover Railways, therefore, bringing together, as they will, the northern and southern suburbs, should be regarded as forming a trunk line of what may be termed the purely Metropolitan railways, from which the full advantages will not be obtained if opportunities are in future lost of connecting other lines of railway with them; for if the Metropolis is to obtain the greatest possible benefit from the various railways now converging to its centre, it will be by establishing as far as practicable direct inter-communication between them.

Nor is the direct convenience and comfort of passengers the only point to be regarded, for the same means which would give facilities to them, would enable goods to be conveyed without break to or from all parts of the Metropolis; and the relief of the streets in any degree from the ponderous goods vans which now roll through them at considerable speed must be regarded as a great public benefit.

Indeed, it may be further remarked that although the question of Metropolitan and City convenience has alone been alluded to by me here, the subject has really a far wider scope, as it embraces the question of unbroken railway communication between various parts of England remote from the Metropolis.

The extension of the Great Eastern as now proposed will so far effectually prevent direct intercommunication with the trunk line of Metropolitan railways and its branches, that passengers arriving by either of the two railways and wishing to continue by the other, will have to leave the terminus, cross Finsbury Place, and go up or down between seventy and eighty steps with all the trouble, inconvenience, and loss of time consequent thereupon.

Now in the year 1861, the Great Eastern Railway was proposed to be extended to Finsbury Circus by a different route from the present scheme. It was intended to join on to the Metropolitan Railway, and there was to have been a grand General Station in the Circus for the use of both railways. That part of the scheme which embraced a Station in the Circus with other important features is for the present abandoned; but the construction of the Eastern line as then designed

is still practicable and would give to the public all the accommodation it will have by the present scheme, whilst it would in addition put the North and North West, the East and the South of London into that unbroken railway communication which appears to me to be so desirable.

Nor can anything be now said against the general principles of the Eastern Extension as proposed in 1861, for the completion of the Metropolitan Railway, and its complete success must remove all doubts and objections as to the extension of the system upon which it is based, and of which the public as yet have but the slightest part of the benefits which will ultimately accrue from its construction.

This extension, therefore, seems to me to demand the most careful consideration, not only of your Honourable Court and of the Corporation of the City, but likewise of those Railway Companies which will at a future day run trains up to Finsbury, and those sections of the Metropolis now unprovided with railway accommodation, but which hope at some future day to be accommodated by it; and if an unbroken system be, as it seems to me, a matter of importance in relation to postal arrangements, the scheme demands the special attention of the Government.

THE METROPOLITAN BRIDGE COMPANY'S
BILL

Is to incorporate a Company with power to make five new bridges over the River Thames, namely, from Irongate Stairs to Horselydown; from St. Paul's Wharf to Bankside; from the Temple Steamboat Pier to the Commercial Road, Lambeth; from Cheyne Walk, Chelsea, to the Albert Road, Battersea; and from the York Road, Wandsworth, to the King's Road, Fulham. That which immediately affects the City, is the "St. Paul's Bridge," which is to start from Paul's Wharf, to span the river from that point, and is to be for foot passengers only.

The Company does not propose to take any property within the City; the only area scheduled is a small portion of the public way known as Paul's Wharf, which is apparently to be used for forming steps or an incline to get to the general level of the bridge, and is not to interfere with the access of passengers to the steam-boat pier at that spot.

The toll is to be one half-penny per passenger, and the bridge itself cannot be otherwise than a public benefit if it be constructed, and the same may indeed be said of the others; and it will be scarcely possible to overrate the convenience of a

bridge for foot passengers across the River Thames, east of the Tower of London, if it can be accomplished.

THE BLACKFRIARS BRIDGE BILL

Is to enable the Corporation to construct a new bridge in lieu of the present one, with power to take certain properties upon both sides of the river immediately adjoining the bridge, so as to improve the approaches; that in the City comprises most of the property in Chatham Place, the area being 3 roods 25 perches.

The property on the western side of Chatham Place is also scheduled by the Metropolitan Board of Works for the Thames Embankment.

The Bill for the New Street from Blackfriars Bridge to the Mansion House is promoted by the Metropolitan Board of Works.

The Thames Embankment was sanctioned by the Legislature during the last session of Parliament. It joins the City at Blackfriars Bridge by a junction with Chatham Place, from which point the New Street is to start.

The centre line of the street curving eastward, crosses Earl Street, and runs parallel with it to St. Andrew's Hill, proceeding with a slightly northern inclination to Bennet's Hill, which it crosses at about 130 feet north of Thames Street, it crosses Peters Hill and Lambeth Hill, midway between Thames Street and Little Knight Rider Street, and curving upwards, enters Cannon Street West by the branch laid out by the Corporation of the City some years ago ; it then runs straight to the north angle of Charlotte Row, by the Mansion House, crossing Queen Street at the junction with Watling Street, Pancras Lane, and Bucklersbury.

The street is proposed generally to be 70 feet wide ; that portion which was laid out by the Corporation a few years since, when they first projected the street, and which now forms a junction street between Cannon Street West and Old Fish Street, is to be left 60 feet in width. Powers are to be taken to widen Upper Thames Street from St. Andrew's Hill to within a few feet of Bennet's Hill, so as to make it about 35 feet in width.

Bennet's Hill is no longer to continue in a straight line from Thames Street to Great Knight Rider Street, but will be stopped on the southern side of the new street where it crosses it. At about

50 feet westward of that point, a fresh junction with the new street is to be made which is to be continued southwards to St. Bennet's Church, it is then to curve round the northern side of the church, and again enter the present line of Bennet's Hill, by which it is to continue as at present to Upper Thames Street.

Lambeth Hill will also be diverted from its present course—it will be stopped up about the middle, at the point where it is crossed by the new street. About 60 feet eastward of that point, it will be continued by a new junction in a southerly direction for about 70 feet, and from thence turning westwards until it again enters its present line about 100 feet north of Thames Street.

Old Fish Street Hill and Bread Street Hill will be much altered; both will continue as at present from Old Fish Street to the northern side of the New Street; but on the southern side they will be stopped up, the line of houses in the New Street being continued across them.

The upper end of Fyefoot Lane will be opened into the New Street with an increased width, and about 80 feet south of its junction branches will open from either side, the one leading to Old Fish

Street Hill, the other to Bread Street Hill, which two streets will from those points continue upon their present course to Upper Thames Street. The upper part of Eyefoot Lane therefore will continue the communication between them and the New Street.

The property scheduled is very irregular in outline, and cannot be described with accuracy so as to be intelligible without inspecting the plan; it may be stated generally that the whole of the property on the north side of Earl Street, to a distance of about 90 feet northwards, is included; also the whole of the property in Upper Thames Street from St. Andrew's Hill to Old Fish Street Hill, which lies between the north side of Upper Thames Street and Great Knight Rider Street, Little Knight Rider Street, and Old Fish Street. There is a considerable area of property upon either side of the line up to the Mansion House, and property having a frontage of 130 feet towards the Poultry is also included.

The total area scheduled within the limits of deviation is 19 acres and 18 perches, which includes the area of various streets and public places.

The formation of this street cannot fail to have a most beneficial effect upon the traffic of the City, and be of great convenience to the whole metropolitan public. And as so much property is taken which now forms collateral streets, it would be most desirable if those streets when re-built were widened.

The Bill is not yet printed—the description given, is therefore taken from the plans deposited, and from information also given to me at the office of the Metropolitan Board of Works.

By most of the various projects reported upon, the Sewerage will be materially interfered with.

I have the honour to remain,

GENTLEMEN,

Your most obedient Servant,

WILLIAM HAYWOOD,

Engineer and Surveyor.

REPORT
OF THE
WORKS EXECUTED
BY THE
HON. THE COMMISSIONERS OF SEWERS
OF THE
CITY OF LONDON,
DURING THE YEAR 1862.

BY
WILLIAM HAYWOOD, M. INST. C.E., F.R.I.B.A.,
ENGINEER AND SURVEYOR TO THE COMMISSION.

February 1863.

LONDON :
PRINTED BY M. LOWNDS, 148 $\frac{1}{2}$, FENCHURCH STREET, CITY, E.C.
1863.

*At a Meeting of the Commissioners of
Sewers of the City of London, held at
the Guildhall of the said City, on Tuesday,
3rd of February, 1863:—*

The Engineer and Surveyor laid before the
Court a Report as under:—

ORDERED—

That the same be printed, and a copy be sent to
every Member of this Court.

JOSEPH DAW,

Principal Clerk.

REPORT

OF THE

WORKS EXECUTED BY THE HONOURABLE
THE COMMISSIONERS OF SEWERS

OF THE

CITY OF LONDON,

DURING THE YEAR 1862.

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REPORT

OF THE

WORKS EXECUTED BY THE HONOURABLE
THE COMMISSIONERS OF SEWERS

OF THE

CITY OF LONDON,

DURING THE YEAR 1862.

TO THE HONOURABLE THE COMMISSIONERS OF
SEWERS OF THE CITY OF LONDON.

SEWERS' OFFICE, GUILDHALL,

February 3rd, 1863.

GENTLEMEN,

I beg to lay before you my Report upon the works you have executed, and upon your transactions generally, during the year 1862.

SEWERS.

The total length of new sewers built was but 888 feet, of which 396 feet were reconstructed upon the line of old sewers.

HOUSE DRAINAGE.

The total number of premises drained during the year 1862, was	171
The approximate number of premises known to be drained at the end of the year 1861, was	13,184
The total number of houses, of which some record is now possessed as to their being drained, is about	13,355
The approximate number of premises, about the drainage of which nothing is known, and which have hitherto been set down as undrained, is about	2,645

HOUSE DRAINAGE PLANS.

During the year 129 plans which show the drainage of 171 houses were made, nearly one half of the plans were for the drainage of new premises.

IMPROVEMENTS.

Improvements were effected by setting back the fronts of Nos. 189 Fleet Street; 39 Lothbury; 59 Great Tower Street; 39 Throgmorton Street; 119 Leadenhall Street; and the fronts of premises in Hutchison Street, Little Distaff Lane, and at

the south-west corner of Milk Street; also in Threadneedle Street, by removing the railings in front of the Baltic Coffee House; the widening of London House Yard, between St. Paul's Churchyard and Paternoster Row was completed.

The houses, Nos. 100, 102, 103, 104, Fenchurch Street; and 69A and 70, Leadenhall Street, have been purchased with the view of improving those thoroughfares.

Ground has been purchased also, with the view of improving the public ways leading out of and across Angel Alley, Bishopsgate Street; and arrangements made for widening in a small degree the northern end of Lime Street.

Negotiations are in hand for purchasing the freeholds of Nos. 54, 55, 56, 57, and 58, Great Tower Street, with the view of completing the widening of that Street, from Mark Lane to Tower Hill. No. 18 Bull and Mouth Street has been agreed to be purchased with the view of opening a carriage-way between Little Britain and King Edward Street; negotiations are also pending for improving the south-west corner of St. Mary Axe, and widening Upper Thames Street, between Nos. 148 and 151, and also in front of Rutland Wharf; for widening a portion of Church Passage, leading from Guildhall Yard into Gresham Street, and Colchester Street at its junction with Cooper's Row.

The following List of Situations of the various improvements which have been effected during the last twelve years by the Commission, may be useful, as showing that almost every important thoroughfare has had some alteration effected in it, and that nearly every ward has had its share of the money which has been expended:—

Ward.	Year.	Situation where Improvements were effected.
Cripplegate Without..	1851	Moor Lane, East side.
Billingsgate	„	Philpot Lane, East side.
Cripplegate Within ..	„	Milk Street, North-east corner.
Bishopsgate Without .	„	Half Moon Street, East end.
Castle Baynard	„	Thames Street, between Ben- net's Hill and Addle Hill.
Tower.....	„	Thames Street, Tower Hill, angle of.
Langbourn	1852	Lime St., East side, South end.
Cheap	„	Gresham St., North-east corner of King Street.
Cordwainers	„	Budge Row, South side.
Farringdon Without..	„	West Street, Smithfield.
Ditto ..	„	Chancery Lane.
Ditto ..	„	Fetter Lane, Fleur-de-lis Court, portion of.
Bishopsgate Without .	„	Rose Alley, New Court, Bishopsgate street.
Coleman Street	1853	White's Alley.
Ditto	„	Whalebone Court.
Portsoken	„	Middlesex Street.
Ditto	„	Stoney Lane.
Castle Baynard	„	Thames Street, West of Peter's Hill.

Ward.	Year.	Situation where Improvements were effected.
Farringdon Without ..	1853	Chancery Lane.
Ditto ..	1854	Ditto
Queenhithe	„	Thames Street, East of Peter's Hill.
Farringdon Without ..	„	Fetter Lane.
Ditto ..	„	Fleur-de-lis Court.
Cordwainers	„	Budge Row.
Bread Street	„	Little Distaff Lane.
Broad Street	„	Throgmorton Street.
Portsoken	„	Houndsditch.
Billingsgate	„	Pudding Lane, South-west corner.
Farringdon Within ..	„	Printing House Lane.
Coleman Street	„	White's Alley.
Farringdon Within ..	„	Newgate Market.
Farringdon Without ..	1855	Chancery Lane.
Ditto ..	„	Fetter Lane.
Cordwainers	„	Budge Row.
Portsoken	„	Harrow Alley, Aldgate.
Cripplegate Without ..	„	Little Moorfields.
Cripplegate Within ..	„	Love Lane, Wood Street.
Ditto ..	„	Little Love Lane, Wood Street.
Aldersgate Within ..	„	Oat Lane.
Ditto ..	„	Lilypot Lane.
Farringdon Without ..	1856	Fleur-de-lis Court.
Ditto ..	„	Fetter Lane.
Tower	„	Mark Lane, South end.
Farringdon Within ..	„	Newgate Street.
Cheap	„	Pancras Lane.
Bread Street	„	Little Distaff Lane.
Farringdon Within ..	1857	Chancery Lane.
Ditto ..	„	Fetter Lane.
Aldersgate Without ..	„	Maidenhead Court.

Ward.	Year.	Situation where Improvements were effected.
Broad Street	1857	Threadneedle Street.
Bridewell Precinct ..	„	Tudor Street.
Coleman Street	„	Lothbury.
Langbourn	„	Mincing Lane.
Cordwainer	1858	Bow Lane.
Cripplegate Within ..	„	Gresham Street West.
Ditto Without..	„	Aldermanbury Postern.
Castle Baynard	„	Little Knightrider Street.
Ditto	„	Little Carter Lane.
Coleman Street	„	Little Bell Alley.
Aldgate	„	Fenchurch Street.
Ditto	„	Leadenhall Street.
Portsoken	„	Minories.
Bassishaw	„	Mason's Alley.
Coleman Street	„	White Rose Court.
Farringdon Within ..	1859	Newgate Street.
Ditto Without..	„	Fleet Street.
Queenhithe	„	Upper Thames Street.
Portsoken	„	Aldgate.
Cordwainer	„	Size Lane.
Ditto	„	Budge Row.
Tower	„	Great Tower Street.
Cordwainer	„	Watling Street.
Cripplegate Without..	„	Barbican.
Aldgate	„	Fenchurch Street.
Farringdon Without..	„	Fetter Lane.
Cheap	„	Pancras Lane.
Farringdon Without ..	„	Plough Court.
Queenhithe	1860	Upper Thames Street.
Billingsgate	„	Lower Thames Street.
Castle Baynard	„	Upper Thames Street.
Bread Street	„	Bread Street and Old Fish St.
Cheap	„	Lawrence Lane.

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Ward.	Year.	Situation where Improvements were effected.
Tower.....	1860	Great Tower Street.
Lime Street	„	Leadenhall Street.
Bishopsgate Without..	„	Bishopsgate Street.
Aldgate	„	Aldgate.
Broad Street	„	Lothbury.
Cordwainer	„	Watling Street.
Tower.....	1861	Great Tower Street.
Cordwainer.....	„	Watling Street.
Castle Baynard	„	Godliman St. and Little Knight- rider Street, corner of.
Queenhithe	„	Little Trinity Lane.
Castle Baynard	„	Little Knight-rider Street.
Ditto ..	„	Little Carter Lane.
Farringdon Within ..	„	St. Andrew's Hill.
Vintry	„	Maiden Lane and Queen Street, corner of.
Bassishaw	„	Basinghall St., Northern end.
Farringdon Within ..	„	King Edward St., Southern end.
Ditto ..	„	Newgate Street.
Farringdon Without..	1862	Fleet Street.
Broad Street	„	Lothbury.
Tower.....	„	Great Tower Street.
Broad Street	„	Throgmorton Street.
Lime Street	„	Leadenhall Street.
Portoken	„	Hutchison Street.
Bread Street	„	Little Distaff Lane.
Cripplegate Within ..	„	Milk Street, North-west corner.
Broad Street	„	Threadneedle Street.
Castle Baynard	„	London House Yard.

SURFACE CLEANSING AND REMOVING DUST FROM PREMISES.

The contracts for scavenging and dusting were let from Midsummer 1862 to Midsummer 1863, for £8,415, which was £163 more than the letting of the previous year. No matter specially worthy of remark occurred under this head.

The contracts of the last five years have been as follows:—

For the year ending Midsummer 1859	..	£8,116.
Ditto ditto 1860	..	7,202.
Ditto ditto 1861	..	8,779.
Ditto ditto 1862	..	8,252.
Ditto ditto 1863	..	8,415.

STREET SURFACE WATERING.

The contracts were let at £1,365, being £38 more than the previous letting—this was the seventh year since the Commission undertook the street watering of the City, which previously had been left entirely to the arrangement of the inhabitants in those streets where the custom of surface watering was adopted.

The contracts during that period have been let at the following sums:—

1856	.....	£1,646
1857	.....	1,470
1858	.....	1,485
1859	.....	1,244
1860	.....	1,263
1861	.....	1,327
1862	.....	1,365

The area watered in 1856 was considerably less than it now is.

PAVEMENTS.

Earl Street, Threadneedle Street, the southern portion of Queen Street, and western end of the Poultry, were paved with new stone.

The principal carriage-ways re-laid were those of Castle Street, Holborn; Cursitor Street, Little Britain, Duke Street, Bull and Mouth Street, Angel Street, Liverpool Street, Eldon Street, and Aldermanbury. The wood pavements of Lothbury, Bartholomew Lane, and Old Bailey, were re-laid.

416 yards of cast iron carriage-way pavement were in the beginning of May laid down in the Poultry. In connection with it was laid cast iron rams of Redman's patent; in the same thorough-

fare, also, were laid specimens of the cast iron tramway of Mr. Carey.

URINALS.

The authorities of the Bank of England having given the Commission notice of their intention to remove the urinals which they had some years previously allowed to be erected against the walls of the Bank in Lothbury, the Commission decided to erect a urinal in the centre of the carriage-way of Lothbury which was done in the month of September last.

That also in the centre of the carriage-way of Holborn, which would accommodate two persons only at the same time, was replaced by one capable of accommodating six persons.

One was erected in the Churchyard of St. Dunstan's in the East to accommodate two persons.

The Commission has, during recent years, proved that the best situations for these erections are in the centres of the carriage-way, when the streets are wide enough to admit of their being erected there, or upon portion of churchyards where they are immediately adjacent to the main thoroughfares.

PUBLIC LAMP LIGHTING. •

The operation of the Metropolis Gas Act, determining the then existing contracts of the Commission, new contracts were entered into in the beginning of the year, which took effect upon the 1st February and expired upon the 31st January of the present year.

The northern district of the City was agreed to be lighted under the usual conditions by the Chartered Gas Light Company, with burners consuming 5 cubic feet of gas per hour, at £4. 14s. 6d. per lamp per annum.

The southern district was agreed to be lighted by the Great Central Gas Company, with burners consuming 3 cubic feet of gas per hour, at £3 per lamp per annum; but to that district the Carburing process was applied at the rate of 16s. per lamp, making the total cost £3. 16s. per lamp per annum. It was expected that the lamps would have been fitted with the apparatus, and the process been in full operation by about the end of March, but delay occurred, owing to various circumstances, and the whole number of lamps in that district were not fitted up with the Carburetors before the end of May.

The probable saving to the Commission, when the contracts were let, was estimated at between £1,100 and £1,200 by the adoption of the Carbu-

rating process in that district only; but that saving will not be quite realised owing to the delay in affixing the Carburators, it will, however, be considerable.

For some years past, there having been much complaint about the public lighting of the City, the Commission directed experiments to be made with the view of ascertaining whether the full quantity of gas was supplied to the public lamps, and if the Carburating process was successful, and to obtain information upon other points likewise.

The circumstances attending those investigations have been made the subject of recent reports by Dr. Letheby and myself, and do not need further reference here.

Upon full consideration of those reports, and of antecedental as well as current circumstances, the Commission determined that it was expedient to burn gas at the public lamps in future by meter, to acquire the whole of the pipage, and take upon itself the lighting, cleaning, and repairs of the lanterns, as well as the Carburation of the gas.

The Commission was of opinion that meters were not needed to every lamp, but that all reasonable requirements would be met if one meter was affixed to every five or six lamps, proper arrangements being made with regard to the others. The gas companies, however, refused to accept those conditions, and required a meter to every lamp.

The Commission, therefore, considered it preferable to affix a meter to each lamp rather than to continue the existing system; but as the time was exceedingly limited for procuring and fixing meters, and making other requisite arrangements, they determined to affix meters in the first place to the southern district only, that being the district where the gas was Carburated, and where it was of importance to the fair trial of the experiment, that the full stipulated quantity of gas should be given.

They also determined to continue the Carburating process in the southern district, applying the process by their own agent, and paying the Company a royalty for their patent; it was intended, therefore, that the gas company should do nothing more than supply the gas contracted for.

Specifications were accordingly prepared upon the foregoing conditions, and tenders received for the supply of gas for one year, from the 1st February, 1863, and upon 16th December, 1862, the following tenders were received, the companies, as will be seen, tendering in accordance with their own views as to the form, and with little reference to the specifications and demands of the Commission, both have since declined to be bound by any conditions contained in the specification of the Commission, or by any but those contained in the Metropolis Gas Act.

SOUTH DISTRICT.

NAME OF COMPANY TENDERING.	Description of Burner.	Gas if burnt by Meter at per 1,000 cubic feet.	Lighting extinguishing, and repairing Lanterns, at per Lamp per annum.	Transferring Services at per Lamp.	Total per Lamp per annum.
		£ s. d.	£ s. d.	£ s. d.	£ s. d.
The Great Central Gas Co.	....	0 4 4	0 15 0		
The City of London Gas Co.	....	0 4 6	0 15 0	0 10 0	
		At per Lamp per annum.			
The Great Central Gas Co.	3 feet burners	2 14 8	0 15 0	....	3 9 8
" " "	4 " "	3 12 10	0 15 0	....	4 7 10
" " "	5 " "	4 11 0	0 15 0	....	5 6 0
The City of London Gas Co.	3 " "	2 16 6	0 15 0	0 10 0	4 1 6
" " "	4 " "	3 15 6	0 15 0	0 10 0	5 0 6
" " "	5 " "	4 14 6	0 15 0	0 10 0	5 19 6

NORTH DISTRICT.

NAME OF COMPANY TENDERING.	Description of Burner.	At per Lamp per annum.	Lighting, extinguishing, and repairing, Lanterns, at per Lamp per annum.	Transferring Services at per Lamp.	Total per Lamp per annum.
		£ s. d.	£ s. d.	£ s. d.	£ s. d.
The Great Central Gas Co.	3 feet burners	2 14 8	0 15 0	0 10 0	3 19 8
" " "	4 " "	3 12 10	0 15 0	0 10 0	4 17 10
" " "	5 " "	4 11 0	0 15 0	0 10 0	5 16 0
The Chartered Gas Co. ..	2 " "	1 18 0	0 15 0	....	2 13 0
" " "	2½ " "	2 9 6	0 15 0	....	3 4 6
" " "	3 " "	2 18 6	0 15 0	....	3 13 6
" " "	4 " "	3 16 0	0 15 0	....	4 11 0
" " "	5 " "	4 14 6	0 15 0	....	5 9 6

The Chartered Gas Company also tendered to supply Gas to be burnt by meter, upon "the usual terms."

At the same time tenders were received for supplying and affixing meters to the lamps in the southern district of the City; and likewise tenders for lighting, extinguishing, cleaning, and repairing the lanterns, and for attending to the Carburating process in the same district.

It was found that but one maker only had tendered for the supply of meters, and as the Commission was led to believe that it was impossible before the expiration of the then existing contract to affix the number required, and acquire the pipage, &c., and as questions arose as to the ugly appearance of meters affixed to the lamp-posts, as to the best mode of affixing them elsewhere, and various collateral points, it was decided to endeavour to arrange with the Great Central Company for lighting upon the former conditions for a period of five months, and to contract for one year with the Chartered Gas Company.

The matters were accordingly so arranged, and as the contracts now stand, the northern district is to be lighted for one year by the Chartered Gas Company with burners consuming 5 cubic feet of gas per hour, the Company lighting and repairing as heretofore at £5. 9s. 6d. per lamp per annum.

The southern district to be lighted until 30th June, 1863, by the Great Central Gas Company, with burners consuming 3 cubic feet of gas per hour; the Company lighting, extinguishing, re-

pairing, &c., at the rate of £3. 10s. per lamp per annum.

At the prices at which the Commission has agreed for the application of the Carburating process, the total cost per lamp in the southern district will be for the five months, £1. 19s. per lamp, or at the rate of £4. 13s. 7 $\frac{1}{4}$ d. per lamp per annum; showing, as compared with the price to be paid to the Chartered Company, a saving of 15s. 10 $\frac{3}{4}$ d. per lamp per annum, by the adoption of the Carburating process, and as compared with the tendered price of the Great Central Gas Company 12s. 4 $\frac{3}{4}$ d. per annum; but a far larger saving might be anticipated, if arrangements could have been made for one year, in lieu of five months, and the Commission had undertaken the lighting, extinguishing, and charge of the lanterns as it desired to do.

The prices paid by the Commission have varied greatly within the last twenty years, and it may be interesting to set before them here a statement of the charges paid for public lighting, and of the prices paid by the citizens for gas supplied and charged by meter during the last twenty years.

It will be seen that the price per lamp is higher now than it was twenty years ago.

Table showing the prices charged per 1,000 cubic feet for Gas for private consumption, by the Companies supplying the City of London, and the prices paid by the Commissioners of City Sewers for lighting the Public Lamps, from 1843 to 1863 inclusive.

NAME OF COMPANY CONTRACTING WITH COMMISSION FOR THE PUBLIC LIGHTS.											
CITY OF LONDON GAS COMPANY.				CHARTERED GAS COMPANY.				GREAT CENTRAL GAS COMPANY.			
Batswing burner, estimated consumption 5 cubic feet per hour, price per lamp per ann., including lighting, extinguishing, and repairing.				Batswing burner, estimated consumption 5 cubic feet per hour, price per lamp per ann., including lighting, extinguishing, and repairing.				Batswing burner, estimated consumption 5 cubic feet per hour, price per lamp per ann., including lighting, extinguishing, and repairing.			
Price per 1,000 cubic feet, supplied by Meter to Inhabitants.				Price per 1,000 cubic feet, supplied by Meter to Inhabitants.				Price per 1,000 cubic feet, supplied by Meter to Inhabitants.			
s.	d.	s.	d.	s.	d.	s.	d.	s.	d.	s.	d.
1843	8	0	0	8	0	4	10	0	0	3	17
1844	8	0	&	7	0	4	10	0	0	3	17
1845	7	0	0	7	0	4	4	0	0	3	3
1846	7	0	0	7	0	4	4	0	0	3	3
1847	7	0	&	6	0	4	4	0	0	3	3
1848	6	0	0	6	0	4	4	0	0	3	3
1849	5	0	0	5	0	4	4	0	0	3	3
1850	4	0	0	4	0	4	4	0	0	3	3
1851	4	0	0	4	0	3	12	0	0	4	0
1852	4	0	0	4	0	2	19	6	6	4	0
1853	4	0	0	4	0	2	19	6	6	4	0
1854	4	0	0	4	0	2	19	6	6	4	0
1855	4	0	0	4	0	2	19	6	6	4	0
1856	4	0	0	4	0	4	2	0	0	4	0
1857	4	0	0	4	0	4	2	0	0	4	0
1858	4	0	0	4	0	4	2	0	0	4	0
1859	4	0	0	4	0	4	2	0	0	4	0
1860	4	0	0	4	0	4	8	0	0	4	10
1861	4	0	&	4	6*	4	8	0	0	4	10
1862	4	6	0	4	6	4	14	6	6	3	0
1863	4	6	0	4	6	5	9	6	6	3	10

The Contracts for Public Lighting were let from Midsummer to Midsummer, until the passing of the Metropolis Gas Act of 1860, by which Act all then existing Contracts between the District Boards and the Metropolis Gas Companies, were made to expire on the 31st January, 1862; from that time the Contracts have been let from 1st February.

* Raised at Michaelmas to 4s. 6d.

WATER SUPPLY.

The amount paid by the Commission this year for water was as follows:—

For supply to Urinals	£341	11	10
For Flushing Sewers	15	3	0
For Washing Courts	123	14	0
For Drinking Fountains ..	25	0	8
	£505	9	6

The cost of water to the Commission is higher than it ever has been.

This total does not include the money paid indirectly by the Commission for surface watering. The total amount therefore paid by the Commission is very large compared with that paid ten years ago.

DANGEROUS STRUCTURES.

The business transacted by the Commission under the Metropolitan Buildings' Act may be gathered from the following summary of cases:—

Number of structures reported upon by the	
Surveyors appointed by the Commission ..	108
Number of cases heard before Magistrates ..	29

Number of buildings shored up during the year	17
Number of cases certified by the Surveyors as being completed	91

These numbers do not differ very materially from those of the year 1861.

DRINKING FOUNTAINS.

No additional fountains were erected during the year. There are but five within the jurisdiction of the Commission.

HOUSE INSPECTION AND REMOVAL OF NUISANCES.

From the return prepared by your Principal Clerk it appears that during the year 7,875 inspections of houses were made by the District Inspectors under the direction of your Medical Officer of Health, and, consequent upon their reports, the following notices were issued:—

For works of drainage	6
For preventing the issue of waste water upon the surface of pavements.....	73
For lime-whiting and cleansing the interior of premises	1,178
Total.....	<u>1,257</u>

SLAUGHTER-HOUSES.

The number of slaughter-houses existing in the City is now 65, being one less than at the end of 1861.

COW-HOUSES.

The number of cow-houses is now 19, being 1 more than at the end of 1861, in which 251 cows are kept.

LODGING-HOUSES.

The number of houses upon the Register is 130, being an increase of 4 upon the registration of the previous year.

CITY CEMETERY.

The number of interments in the Cemetery during the year 1862, was 8,923, being 819 more than the previous year.

The large and increasing number of interments which annually take place in the Cemetery, rendered it expedient in the opinion of the Board to enlarge its area, and $15\frac{1}{2}$ additional acres were accordingly enclosed and laid out, the total area is

now 105 acres. A portion of the additional area and the whole of the area originally enclosed, and which had been reserved for future appropriation, was consecrated on the 6th of August last, by the Lord Bishop of London.

MISCELLANEOUS.

There were fewer projects for railways and other purposes, for which bills were deposited at the beginning of the session, than has been the case for some years past; those which passed into law were the Metropolitan Railway Additional Lands, Station and Railway Works Bill, and the Metropolitan Meat and Poultry Market Bill.

The Commission experienced the greatest difficulty throughout the year in preventing tablets or sign-boards from being projected over the public ways. The subject generally, is now under its consideration.

The subject of providing secure means of crossing over the main thoroughfares which in the busy portions of the day is a matter of much difficulty, was also under its consideration, and is so at the present time.

The duties of the Inspectors of meat, slaughter, and cow-houses, are now exercised under the sole direction of the Medical Officer of Health, and

were revised during the year. The duties of Inspection of lodging-houses are also under his direction, and the subject is only introduced here to make the Report a general record of the principal business of the Commission during the year.

And have the honour to remain,

GENTLEMEN,

Your most obedient Servant,

W. HAYWOOD,

Engineer and Surveyor.

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REPORT

TO THE

COMMITTEE UPON GENERAL PURPOSES OF THE
HONOURABLE THE COMMISSIONERS OF SEWERS
OF THE CITY OF LONDON,

UPON

BRIDGES AND SUBWAYS

ACROSS CARRIAGEWAYS,

FOR THE

USE OF PEDESTRIANS.

BY

WILLIAM HAYWOOD,

ENGINEER AND SURVEYOR TO THE COMMISSION.

March the 13th, 1863.

LONDON:

PRINTED BY M. LOWNDS, 148 $\frac{1}{2}$, FENCHURCH STREET, CITY, E.C.

1863.

*At a Meeting of the Committee upon General
Purposes of the Honourable the Com-
missioners of Sewers of the City of
London, at the Guildhall of the said
City, on Friday, March the 13th,
1863.*

The Engineer and Surveyor laid before the
Committee a Report as under:—

IT WAS ORDERED—

To be printed and a Copy sent to every
Member of this Court.

JOSEPH DAW,

Principal Clerk.

REPORT
UPON
BRIDGES AND SUBWAYS
ACROSS CARRIAGEWAYS,
FOR
THE USE OF PEDESTRIANS.

TO THE COMMITTEE UPON GENERAL PURPOSES
OF THE HONOURABLE THE COMMISSIONERS
OF SEWERS OF THE CITY OF LONDON.

SEWERS' OFFICE, GUILDHALL,
13th March, 1863.

GENTLEMEN,

Pursuant to your reference, I have considered the subject of the inconvenience at present felt by the public when crossing the main thoroughfares of the City during the busy hours of the day, and have given attention to the plans submitted to you by Mr. Williams, of forming bridges over the streets, and by Mr. Newton, of forming subways beneath the streets, so as to enable pedestrians to cross without danger or loss of time; and have also considered the other suggestions for the same purpose which have been made to you.

BRIDGES OVER STREETS.

These, as matter of construction, are perfectly practicable, the principal conditions which must be observed in their formation and maintenance are as follows:—

They must leave a clear height of 18 feet above the entire width of the carriageway.

The width that would be requisite must depend upon the traffic which might be expected to pass over them; 10 feet in the clear appears to me to be the least that should be given, for their construction could scarcely be justified, unless a large usage was expected.

They must be strong enough to sustain great weights, and unequal loading; for they would be subject to be densely and unequally loaded.

As sight-seers, and idle people would congregate upon them, each bridge would require two policemen to be constantly present to insure circulation and order.

To construct inclines to arrive at the level of the bridges would clearly be an impossibility in the City, the access must therefore be by staircases.

As the level of the bridges would be about 19 feet above the level of the pavement it would require thirty-eight steps to ascend, and as many to descend them.

Circular staircases, which would occupy the least room, would however occupy the room in the most inconvenient manner, if taken from the streets; indeed there are no streets of sufficient width to enable them to be formed, and they moreover are unfitted for the purpose, inasmuch as portions of the treads being so narrow, they would inevitably lead to accidents.

Staircases upon a different plan would occupy very large spaces, which spaces can in few, if in any parts, be spared for the purpose either from the footways or carriageways.

Steps wherever placed upon the public way, (assuming that they could be so placed and that the Commission has the power to place them there) and whatever the mode in which they might be constructed, would be a nuisance to the inhabitants residing immediately adjacent to them, and probably would cause them pecuniary loss, for which the Commission would have to pay compensation; and even if the staircases were constructed within property belonging to the Commission, a nuisance might be held to be caused by the bridge itself, although doubtless not in so great a degree as where there were staircases over the pathway in addition to the bridge.

The difficulty of finding room for staircases could be obviated by taking houses upon either side of the street, and making within side of them stair-

cases from the ground level up to the level of the bridges. Ample staircase room could be got by such a mode; but at the spots where these crossings would be most useful, the property is of a most valuable nature, and the cost of the bridges with such approaches would therefore be exceedingly great.

I can scarcely imagine that any bridge across a metropolitan thoroughfare can be otherwise than detrimental to its appearance, and as these bridges are principally required across the most important, widest, and handsomest streets, there is but little doubt that they would be eminently detrimental to them; but there is no reason why such bridges should be in themselves ugly, or in any respect like the hideous railway bridges now spanning the streets, which are designed with great disregard to appearance, and almost in defiance either of architectural rule or of the commonest taste: they may, indeed, be pronounced in respect of appearance as a disgrace to the metropolis.

These are some of the difficulties appertaining to the bridges, and I will now proceed to the consideration of the alternative mode.

SUBWAYS BENEATH STREETS.

Making allowance for the depth requisite for the paving stones, pavement bed, pipes, and thickness

of the arch or covering of the subway, about 5 feet 6 inches must be allowed from the surface to the underside or soffit of the covering; to this 8 feet at the least should be added, making together 13 feet 6 from the surface of the street to the paving of the subways.

This depth would in the majority of cases cut the sewers in halves. It is possible that in most situations they might be reconstructed at an increased depth, or means adopted to get over the difficulty, but it could only be at a large cost and great public inconvenience.

The depth would involve a descent and an ascent of 27 steps.

They could be ventilated, but it would be with difficulty; in all cases they must be lighted by gas, and policemen must be always in them or they would prove a nuisance, a lurking place for thieves, or the means of their escape. Upon the occasions of sudden rain the police would with difficulty be able to prevent them being used as places of shelter; indeed, it is difficult to say how it could be prevented at all, unless by closing them altogether upon such occasions by gates placed at the outlets.

The difficulty of finding room for staircases is nearly if not quite as great as it would be for the bridges; but if constructed they would not be so great a nuisance to the inhabitants as the staircases

to the bridges would be, if they were formed upon the public ways.

But ample room for staircases could be obtained (as for the bridges) by purchasing houses, and as a ground floor only would suffice for the staircase to the subways, a larger portion of the upper part of the houses would be available for other purposes.

The subways would in cost, I think, be cheaper than bridges, provided it was found that the pipage and the sewerage did not require altering to a great extent.

Upon consideration of all circumstances, it is difficult to pronounce which would be the best. The bridges would of course suggest themselves to perplexed pedestrians more than the subways, and could alone be found readily by strangers, but the number of steps to be encountered would be greater; whilst the subways, especially if reduced in size to the most economical dimensions, although offering less trouble, certainly would not invite people to go through them.

On the other hand, the fewest steps would be preferable to the old and infirm, as giving the least trouble in ascending and descending.

And on the whole, I think the balance of

advantages would be in favour of the subways.

There is nothing new in the principles of either of the schemes submitted to you,—for bridges across the public ways have been frequently suggested to the Commission; and have been elsewhere spoken of during the last twenty years, and subways for crossings have been suggested even more frequently. The detail of construction is another matter, but it need be but of an ordinary character, when practicable situations were once decided upon.

It is questionable, however, whether the Commission has the power of constructing either the bridges or subways.

Before either bridges or subways are built, the questions arise. Are they absolutely needful? Will they be much used, if constructed? Will they materially lessen the number of accidents? An investigation of the police returns, together with observations of the street traffic, may aid in arriving at a general conclusion upon these points; although nothing but the construction of bridges or subways could conclusively answer the questions.

According to the police returns given in the

Appendix,* the accidents which occurred to people whilst crossing the streets of the metropolis between the 1st of October, 1861, and 30th September, 1862 (a period of one year) were:—

In the City of London.....	171
In the remainder of the metro- polis	204
Total	<u>375</u>

Of the precise situation of those which happened within the Metropolitan District, and of the other circumstances attending them, I have no information. Mr. Deputy Lott has, however, procured for me from the Commissioner of City Police, much detailed information with regard to those which happened within the City, and I confine further consideration to those cases only.

Of those persons to whom accidents happened within the City of London.

5	died from the injuries received.
54	were severely injured.
93	were slightly injured.
13	were not injured.
6	were cases in which injury, if any was not — reported.
171	<u>Total.</u>

* See Appendix, pages 25 to 35.

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No information is possessed as to whether any were suffering from previous physical infirmity.

The ages of those to whom accidents occurred, were (so far as the police have been enabled to supply them,) as follows:—

ADULTS.

Ages.	Males.	Females.	Total.	Per centage of whole.
17 to 30	10 ..	3 ..	13 ..	7·60
30 to 40	15 ..	8 ..	23 ..	13·45
40 to 50	10 ..	5 ..	15 ..	8·77
50 to 60	5 ..	7 ..	12 ..	7·02
60 to 70	14 ..	7 ..	21 ..	12·28
70 and upwards	5 ..	4 ..	9 ..	5·26
	—	—	—	—
	59	34	93	54·38
Children			66	38·60
			—	—
			159	92·98
Ages not known			12	7·02
			—	—
			171	100·00
			—	—

Thus, 52·05 per cent. of the whole number occurred to children and adults between the ages of 30 and 40.

Of the accidents there were caused by.—

	No.	Per centage of whole.
Cabs	60 ..	35·08
Carts	49 ..	28·65
Vans	24 ..	14·04
Omnibuses	19 ..	11·11
Waggons	6 ..	3·50
Chaises	4 ..	2·33
Horses	2 ..	1·16
Two horses	1 ..	0·59
Carriages	1	0·59
Spring carts	1	0·59
Drays	1	0·59
Trucks	1	0·59
Engines	1 ...	0·59
Perambulators ...	1 ...	0·59
Total..		171
		100·00

The principal number of the accidents took place in the following thoroughfares:—

Aldgate	5
Bishopsgate Street, Within and Without	16
Blackfriars Bridge	1
Cannon Street	2
Cheapside	3
Carried forward	27

Brought forward.....	27
Cornhill	3
Eastcheap	1
Farringdon Street.....	1
Fenchurch Street	5
Fetter Lane	3
Fleet Street	6
Gracechurch Street	3
Great Tower Street	1
Holborn Hill and Bridge.....	23
King William Street	14
Leadenhall Street.....	2
Lombard Street.....	2
London Bridge	13
Lower Thames Street	1
Ludgate Hill.....	7
Mansion House Street	1
Minories	1
New Bridge Street	3
Newgate Street.....	4
Poultry	3
St. Mary Axe	3
Skinner Street, Snow Hill	2
Union Street, Bishopsgate	3
Upper Thames Street	2
	134
Remainder in Streets in all parts of the City.....}	37
Total.....	171

The mass of the accidents, however, occurred in streets of the greatest traffic, which comprise among them some of the widest streets. Thus,

King William Street had..	14 or	8·19	per cent. of the whole.		
London Bridge.....	13 or	7·60	„	„	
Holborn Hill and Bridge..	23 or	13·45	„	„	
Bishopsgate Street within } and without	16 or	9·36	„	„	
Ludgate Hill	7 or	4·09	„	„	
Fleet Street	6 or	3·50	„	„	

Which gives 79 or 46·19 per cent. of the whole number as occurring in those seven thoroughfares.

The police returns do not state the exact spots where the particular accidents occurred, there is therefore nothing to shew whether or not the majority of cases occurred at the principal points of crossing, as at the junctions of the streets with other thoroughfares; but the belief of the police is that they were distributed tolerably evenly throughout the length of the various thoroughfares.

The impossibility of crossing with absolute safety is felt throughout the whole of the principal thoroughfares of the central parts of the Metropolis. Within the City there are some miles of street which it is difficult to cross between 8 a.m. and 8 p.m., but this difficulty is principally felt at certain points, amongst which may be enumerated the following:—

1. At the junction of the six streets near to the eastern end of the Mansion House.

2. At the junction of the streets in King William Street by King William's Statue

3. At the junction of Cheapside with St. Paul's Churchyard and Newgate Street.

4. At the junction of Fleet Street, Ludgate Hill, New Bridge Street, and Farringdon Street.

5. At the junction of Cornhill, Gracechurch Street, Bishopsgate Street, and Leadenhall Street.

- 6 At Aldgate near to the junction of Fenchurch Street and Leadenhall Street, the Minories, and Houndsditch.

7. At the western junction of Fenchurch Street with Gracechurch Street.

Now, if the formation of either Bridges or subways is likely to be attempted, I conclude it will be at the two first mentioned spots, and the consideration of the necessity of constructing them I for the present confine to those two situations. I may observe also, that they are the only two situations where room could be abstracted from the carriageways for the formation of staircases and there only by inconveniencing greatly the carriage traffic.

I have had observations taken of the traffic crossing at those points,* and beg to append them. From those observations it appears that during the

* See Appendix, pages 36 and 37.

nine busy hours of the day the carriageways which lie between the western end of the Mansion House and the western junctions of Lombard Street, Cornhill, and Threadneedle Street, with Mansion House Street, and that across the southern end of Princes Street were crossed 56,235 times.*

The carriageway which lies between the junctions of Gracechurch Street and Cannon Street with King William Street near to King William's Statue were crossed 42,395 times.†

What the traffic may be during the remaining fifteen hours of the day is not known ; it, perhaps, is equal to that which passes during the nine hours recorded. If, however, fifty per cent. only be added, it gives—

During every twenty-four hours of the working days of the week a crossing traffic of

84,352 near to the Mansion House,

63,592 near to King William's Statue.

And annually, reckoning the working days of the year only of

26,402,176 near to the Mansion House.

19,904,296 near to King William's Statue.

And assuming that the traffic upon each Sunday during the year was one-fifth of a week day traffic, it gives an annual crossing traffic of about

27,279,416 near to the Mansion House.

20,565,632 near to King William's Statue.

* See Appendix, page 36.

† See Appendix, page 37.

Now, as before stated, there are no means of ascertaining the precise spots at which accidents took place, but it is certain that they were more or less distributed throughout those streets against which they are recorded; and if it be assumed that *half* occurred within the areas of those carriageways over which observations of traffic were taken, it will, in the opinion of the police authorities, be considerably in excess of the actual number.

Indeed, a general consideration of the list of accidents given in the Appendix and of the analyses of the accidents herein given, leads to the belief that more are due to the speed at which vehicles travel than to the mere passage of large numbers of vehicles at spots where great numbers of people cross, and if that belief be well founded, the number of accidents assigned to the localities in the vicinity of the Mansion House and King William's Statue must be far beyond the proper number.

Now, the total number of accidents in the whole length of the five streets meeting by the Mansion House was 9, and in the streets near to King William's Statue 19.

These figures, therefore, shew that near to the Mansion House about one person in 6,062,092 crossing met with an accident, and that near to King William's Statue, 1 in 2,164,803 met with an accident. Taking the mean of the two places, 1 in 3,417,503 met with an accident.

The calculations are not, of course, exact; but as the observations of traffic were made with care, and the returns of the police have been made with equal care, as the annual traffic estimated from the observations is certainly *beneath* the true quantity, and the number of accidents assigned to the spots is in *excess* of the quantity, the proportion here given of those injured to those who crossed is certainly greater rather than less than the true one.

My opinion indeed is, that if the accidents were set down at about 1 in 6 or 7,000,000, it will be nearer the truth.

If, therefore, the degree of danger may be judged of by the number of accidents which occurred proportionately to those who crossed the streets at those spots, the danger, it will be seen, is very small.

It is, probable, however, that some accidents of a trifling nature occur annually, which escape the observations of the police; and that there is some risk and very great inconvenience at these points, there can be no doubt; but whether the means proposed will remedy that in an appreciable degree is the question.

It will be observed, that the greatest mass of accidents occurred to children, and to adults in the prime of life, neither of which classes are likely to consider very closely risks of such a kind; it is open to doubt even if the danger was much greater, whether those two classes would avail themselves

of such tedious means of avoiding it as bridges or subways suggest.

It is true that the old, the infirm, the cautious, and the idle might avail themselves of bridges or subways, and the cautious and the idle classes of pedestrians would probably reap in a degree the fruit of their care; but it is by no means sure that the old or infirm would do so to a large extent. A staircase has great objections in their eyes; thousands would sooner risk a crossing, and wait their time for a favourable opportunity to cross than go up and down many stairs, and even if the largest portion determined otherwise, considering that the staircases would be frequently wet and slippery, the probability is that quite as many accidents would occur from slipping and falling upon them as now occur by crossing upon the surface of the carriageways.

Judgment as to whether either construction would be used to more than to a very limited extent, may be assisted by observations which I have had taken at King William Street, which, with London Bridge, appears to be a thoroughfare where a large per centage of accidents occur.

For many years the public has had the means of crossing King William Street near to the bridge without risk, as the steps which lead to Thames Street afford the means of doing so in a convenient manner. It is difficult from any position to ascer-

tain exactly the number who avail themselves of this opportunity of crossing safely, but a very close approximation to the truth may be arrived at, and observations made between 8 a.m. and 8 p.m. show only sixty-three people who did so, whilst 3,382 were observed to cross the carriageway of King William Street, between Arthur Street and the water steps of the bridge, between 8 a.m. and 5 p.m.*

The number of steps from Thames Street to the paving of King William Street is forty.

Upon a careful consideration of the whole subject, the conclusions which suggest themselves to me are that, with the exception of the two spots in the vicinity of the Mansion House and of King William's Statue, neither bridges or subways would be much used by the public, and that even at those spots but few who wished to cross would avail themselves of them; that the number of accidents from vehicles would be scarcely reduced, and that any reduction under that head would be augmented by accidents through slipping up or down the stairs, so that in effect the aggregate injury to life and limb would remain about the same.

In conclusion, I may remark that this subject has had some attention given to it at Paris. There is no spot in London where there is more danger in crossing than at some points of the Boulevards

* See Appendix, page 40.

at Paris ; for the carriageways are there very wide, the traffic during some hours of the day very great and much quicker than in the main streets of the City. There is ample room upon the footway for the construction of staircases, and the bridges would not therefore create annoyance ; moreover, the French architects would, in all probability, so design the bridges as to make them but little detrimental to the appearance of that beautiful highway : neither subways or bridges, however, have been attempted, although some years ago a French engineer designed bridges for that purpose to which he gave the name of *Passerelles*, one of which he proposed to construct at the junction of the Boulevards du Centre St. Denis and Strasbourg.

I have the honour to remain,

GENTLEMEN,

Your most obedient Servant,

WILLIAM HAYWOOD,

Engineer and Surveyor.

METROPOLITAN POLICE.

Return of the number of Accidents which have occurred during the past Year, at Street Crossings in crowded neighbourhoods, within the Metropolitan Police District, from 1st October, 1861, to the 30th September, 1862, inclusive.

DIVISIONS.	Number of Accidents (not Fatal).	Number of Accidents (Fatal).	Total.	REMARKS.
A or Whitehall	38	3	41	
B ,, Westminster ..	9	1	10	
C ,, St. James's	12	—	12	
D ,, Mary-le-Bone ..	13	2	15	
E ,, Holborn	1	—	1	
F ,, Covent Garden.	3	—	3	
G ,, Finsbury	—	—	—	None.
H ,, Whitechapel ..	—	—	—	„
K ,, Stepney	—	—	—	„
L ,, Lambeth	17	3	20	
M ,, Southwark	34	—	34	
N ,, Islington	23	3	26	
P ,, Camberwell	22	1	23	
R ,, Greenwich	—	—	—	None.
S ,, Hampstead	16	3	19	
T ,, Kensington	—	—	—	None.
Y ,, Wandsworth .	—	—	—	„
Total	188	16	204	

Prepared.

Metropolitan Police Office,
22nd October, 1862.

JOHN SEARLE,
Inspector.

Return of the number of Persons who have been knocked down or run over by Vehicles while crossing the Streets in the City, from 30th September, 1861, to 30th September, 1862.

Date 1861.	Streets, &c.	Vehicles, &c.	Male, Female, or Children.			Extent of Injury.
			M.	F.	C.	
1st October....	Blackfriars Bridge	Waggon	..	..	1	Foot severely injured, remained in Hospital.
2nd "	Bishopsgate Street Within.....	Cab	..	..	1	Leg injured.
2nd "	King William Street	Waggon	1	..	..	Arm cut, remained in Hospital.
7th "	King William Street	Van	..	1	..	Lip cut.
10th "	London Bridge.....	Cart	..	1	..	Ankle sprained.
11th "	Cheapside	Cab	..	..	1	Slightly bruised.
12th "	Mansion House Street	Cab	..	1	..	Much bruised.
12th "	Fetter Lane	Van	..	..	1	Killed. Verdict, accidental death.
13th "	Ludgate Hill	Cab	1	..	..	Slightly injured.
14th "	London Bridge.....	Omnibus	1	..	..	Head bruised.
15th " ..	Queen Street	Cab	1	..	..	Foot slightly injured.
17th "	Leadenhall Street	Van	..	..	1	Injury unknown.
17th "	Union Street, Bishopsgate	Cab	..	1	..	Forehead slightly cut.
23rd "	Ludgate Hill	Waggon	..	..	1	Injury unknown.
23rd "	Holborn Hill	Cart	1	..	..	Head cut.

25th "	Fleet Street	Cart	1	..	Leg slightly injured.
26th "	Fenchurch Street	Cart	..	1	Foot slightly bruised.
29th "	Union Street, Bishopsgate	Omnibus	1	..	Head cut, leg and arm bruised.
29th "	Holborn Hill	Cab	1	..	Knee cap fractured, remained in Hospital.
30th "	Lower Thames Street	Cab	..	..	Head cut.
1st November..	London Bridge	Truck	1	..	Three toes broken.
1st "	Swan Street	Cart	1	..	Head cut.
2nd "	Saint Mary Axe	Horse	1	..	Slightly injured.
4th "	Arthur Street East	Cart	1	..	Knee sprained.
6th "	Bishopsgate Street	Cart	1	..	No injury.
8th "	Bishopsgate Street	Waggon	1	..	Thigh bruised.
16th "	Ludgate Hill	Cab	..	..	Thigh broken.
18th "	Lombard Street	Cab	..	1	Slightly bruised.
19th "	Cripplegate Buildings	Chaise	1	..	No injury.
21st "	King William Street	Cart	..	..	Leg broken, remained in Hospital.
29th "	Saint Dunstan's Hill	Van	..	1	Chest slightly injured.
2nd December..	Holborn Bridge	Cab	..	1	Lips bruised.
6th "	Upper Thames Street	Cab	..	1	Slightly bruised.
7th "	Farringdon Street	Van	1	..	Thumb amputated, remained in Hospital.
10th "	Fenchurch Street	Van	1	..	Injuries unknown, remained in Hospital.
10th "	Poultry	Cart	1	..	Ribs seriously injured, remained in Hospital.

Return of Persons knocked down or run over—continued.

Date 1861.	Streets, &c.	Vehicles, &c.	Male, Female, or Children.			Extent of Injury.
			M.	F.	C.	
12th December ..	Aldgate	Cart	..	1	..	Wrist and leg hurt.
12th „	Cornhill	Cab	..	..	1	Slightly bruised.
13th „	Saint Martin's-le-Grand	Cart	1	..	..	Head cut.
15th „	King William Street	Cart	1	..	..	Insensible state, remained in Hospital.
17th „	London Bridge	Cab	1	..	..	Leg broken, remained in Hospital.
19th „	Holborn Bridge	Omnibus	..	..	2	Both legs broken, remained in Hospital.
19th „	Holborn Bridge	Omnibus	..	..	1	No injury.
20th „	Fleet Street	Van	1	..	..	Much bruised.
21st „	Upper Thames Street	Cart	..	1	..	Severe internal injury, remained in Hospital.
23rd „	Lombard Street	Cab	1	..	..	Foot slightly injured.
24th „	Cornhill	Van	..	1	..	No injury.
24th „	Aldersgate Street	Cab	1	..	..	No injury.
25th „	Holborn Bridge	Cab	1	..	..	No injury.
27th „	London Bridge	Omnibus	1	..	..	Leg bruised.
28th „	Aldgate	Cab	..	1	..	Feet slightly bruised.
28th „	Eastcheap	Cart	..	1	..	Slightly bruised.

6th "	Fleet Street	Cab	1	..	..	Left leg broken, remained in Hospital.
10th "	Ludgate Hill	Cab	1	..	..	Leg slightly injured.
11th "	King William Street	Cart	1	..	..	Slight wound under the eye.
14th "	Wormwood Street	Cart	1	..	..	Leg slightly bruised.
18th "	London Bridge	Cab	..	1	..	Not injured.
21st "	Saint Mary Axe	Cab	..	..	1	Injury unknown, remained in Hospital.
22nd "	King William Street	Cab	..	1	..	Slightly bruised.
24th "	Little Moorfields	Cab	1	..	..	Both knees injured.
25th "	Holborn Hill	Omnibus	1	..	..	Arm bruised.
30th "	Old Bailey	Van	1	..	..	Slightly injured.
5th February	Fleet Street	Cart	..	1	..	Head cut.
5th "	New Bridge Street	Chaise	..	..	1	Head cut.
5th "	Holborn Bridge	Cab	..	..	1	Internally injured, remained in Hospital.
8th "	Holborn Bridge	Cart	..	..	1	Head cut, remained in Hospital.
11th "	London Bridge	Cart	..	1	..	Slightly bruised.
14th "	Warwick Lane	Cart	..	1	..	Slightly injured.
16th "	Holborn Hill	Cab	..	..	1	Concussion of the brain, remained in Hospital.
18th "	Snow Hill	Cab	..	..	1	Knee bruised.
20th "	Sun Street	Cart	..	..	1	Right leg much bruised, remained in Hospital.
25th "	Holborn Hill	Cab	1	..	..	Left leg broken, remained in Hospital.
26th "	King William Street	Cart	..	..	1	Chest bruised.

Return of Persons knocked down or run over—continued.

Date 1862.	Streets, &c.	Vehicles, &c.	Male, Female, or Children.			Extent of Injury.
			M.	F.	C.	
28th February ..	Holborn Hill	Omnibus	1	..	..	Wheel over wrist.
1st March	Watling Street.....	Van	1	..	..	Slightly injured.
8th "	Leadenhall Street	Van	..	1	..	Killed. Verdict accidental death.
14th "	Holborn Hill	Cart	1	..	..	Shoulder dislocated and otherwise injured, remained in Hospital.
21st "	Cheapside	Cab	..	..	1	Thighs much hurt, but no bones broken.
22nd "	Fore Street	Spring Cart ..	..	..	1	Slightly bruised.
26th "	Threadneedle Street	Cab	1	..	..	Leg injured.
30th "	Bishopsgate Street Without	Cart	..	..	1	Not injured.
1st April	Bishopsgate Street	Dray	..	..	1	Killed. Verdict accidental death.
4th "	Poultry	Cart	1	..	..	Severe internal injury, remained in Hospital.
4th "	Jewin Street.....	Cab	..	..	1	Head cut.
7th "	Aldgate	Cart	1	..	..	Slightly bruised.
7th "	Aldgate	Cart	..	..	1	Slightly bruised.
12th "	London Bridge.....	Omnibus	1	..	..	Legs bruised.
14th "	King William Street	Omnibus	1	..	..	Cut over eye.
21st "	Bishopsgate Street	Cart	..	..	1	Right leg cut.

28th "	Cornhill	Cab	1	..	..	Broken leg, remained in Hospital.
28th "	Ludgate Hill	Van	..	..	1	Foot slightly bruised.
29th "	Fenchurch Street	Cab	1	..	..	Eye and leg much hurt.
3rd May	Princes Street, Lothbury	Van	1	..	..	Slight bruise on head.
9th "	Houndsditch	Cart	1	..	..	Head cut.
10th "	New Bridge Street	Waggon	1	..	..	Slight injury.
12th "	Bishopsgate Street	Two Horses	1	..	..	Slightly cut over eye.
15th "	Holborn Bridge	Cab	..	1	..	No injury.
16th "	Holborn Bridge	Cab	..	1	1	Injury unknown, remained in Hospital.
19th "	Holborn Bridge	Van	..	1	..	Arm fractured, remained in Hospital.
21st "	London Bridge	Van	1	..	..	Slight injury.
21st "	Gracechurch Street	Cab	..	..	1	Eye cut.
21st "	New Bridge Street	Waggon	..	..	1	Bruised foot.
22nd "	Cannon Street	Cart	..	..	1	Head cut.
22nd "	King William Street	Chaise	..	1	..	Head cut.
24th "	Bishopsgate Street	Cart	..	..	1	Head cut, remained in Hospital.
26th "	London Bridge	Omnibus	1	..	..	Elbow cut (P. C.)
26th "	Red Cross Street	Cab	..	..	1	Killed. Verdict accidental death.
27th "	Fore Street	Cab	..	..	1	Slight injury.
28th "	Holborn Hill	Perambulator	..	1	..	Sprained leg.
30th "	Fish Street Hill	Van	..	..	1	Ankle bruised, remained in Hospital.

Return of Persons knocked down or run over—continued.

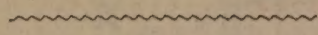
Date 1862.	Streets, &c.	Vehicles, &c.	Male, Female, or Children.			Extent of Injury.
			M.	F.	C.	
31st May	Barbican	Cart	..	1	..	Arm injured, remained in Hospital.
3rd June	Fetter Lane	Van	..	..	1	Slight injury.
4th "	London Bridge	Carriage	..	..	1	Not injured.
7th "	King William Street	Cab	1	..	..	Leg and head cut.
7th "	Newgate Street	Cart	1	..	..	Head cut.
10th "	Old Bailey	Cart	..	..	1	Toe injured.
11th "	Bishopsgate Street Without	Cart	..	..	1	Not injured.
23rd "	Bishopsgate Street Without	Omnibus	..	..	1	Legs bruised, remained in Hospital.
23rd "	Minories	Cab	..	..	1	Foot slightly hurt.
23rd "	Fetter Lane	Cart	..	..	1	Slightly hurt.
25th "	Newgate Street	Van	1	..	..	Head cut.
26th "	Holborn Hill	Omnibus	..	..	1	Died. Verdict accidental death.
27th "	Bishopsgate Street	Van	1	..	..	Not injured.
29th "	Fenchurch Street	Cab	1	..	..	Hand injured.
2nd July	Ludgate Hill	Cart	..	..	1	Slightly injured.
3rd "	Falcon Square	Engine	..	..	1	Foot slightly injured.

8th "	Threadneedle Street	Cart	1	1	Slightly bruised.
12th "	Aldgate	Horse	1	1	Toe injured.
12th "	King William Street	Cab	1	1	Foot injured.
12th "	Fenchurch Street	Cab	1	1	Foot bruised.
13th "	Liverpool Street	Cab	1	1	Thigh and head slightly injured.
14th "	Fleet Street	Cab	1	1	Slightly injured.
15th "	Coleman Street	Cart	1	1	Concussion of brain, remained in Hospital.
16th "	Holborn Hill	Cab	1	1	Slightly hurt.
17th "	Bartholomew Lane	Cab	1	1	Slightly injured.
18th "	Houndsditch	Van	1	1	Thigh broken, remained in Hospital.
19th "	King William Street	Van	1	1	Left leg fractured, remained in Hospital.
20th "	Newgate Street	Cab	1	1	Left thigh injured.
21st "	Bishopsgate Street Without	Omnibus	1	1	Left hand cut by wheel.
22nd "	Holborn Bridge	Cab	1	1	Slightly injured.
24th "	Saint Ann's Lane	Cab	1	1	Face and one leg slightly bruised.
27th "	Moorgate Street	Cart	1	1	Slight internal injury.
29th "	Fleet Street	Cart	1	1	Right foot injured.
31st "	Holborn Bridge	Cab	1	1	Severe wound on head, remained in Hospital.
2nd August	Bishopsgate Street Without	Cab	1	1	Head slightly cut.
2nd "	Gracechurch Street	Van	1	1	Leg bruised.
2nd "	Ludgate Hill	Cart	1	1	Hand and head wounded.

Return of Persons knocked down or run over—continued.

Date 1862.	Streets, &c.	Vehicles, &c.	Male, Female, or Children.			Extent of Injury.
			M.	F.	C.	
4th August	Skinner Street, Snow Hill	Omnibus	..	..	1	Slightly injured.
5th "	Tudor Street	Cab	..	..	1	Leg fractured, remained in Hospital.
6th "	Bishopgate Street	Cart	2	..	..	Heads injured.
8th "	Sun Street, Bishopgate	Cart	..	..	1	Wound on leg.
9th "	Gracechurch Street	Cart	1	..	..	Leg slightly bruised.
11th "	Aldersgate Street	Cab	..	..	1	Leg bruised.
11th "	Newgate Street	Cab	..	1	..	Leg slightly bruised.
13th "	Poultry	Omnibus	..	..	1	Injury unknown, remained in Hospital.
19th "	Bishopgate Street Without	Omnibus	1	..	..	Arms severely bruised.
23rd "	Saint Mary Axe	Cart	1	..	..	Slightly injured.
23rd "	King William Street	Omnibus	..	1	..	Slightly injured.
31st "	King William Street	Cab	1	..	..	Slight bruise on chest.
4th September	Skinner Street, Snow Hill	Omnibus	1	..	..	Head cut.
16th "	Cheapside	Omnibus	1	..	..	Ribs broken, remained in Hospital.
20th "	Cannon Street	Cab	1	..	..	Leg fractured, remained in Hospital.
22nd "	Saint Paul's Churchyard	Cab	1	..	..	Thigh bruised.

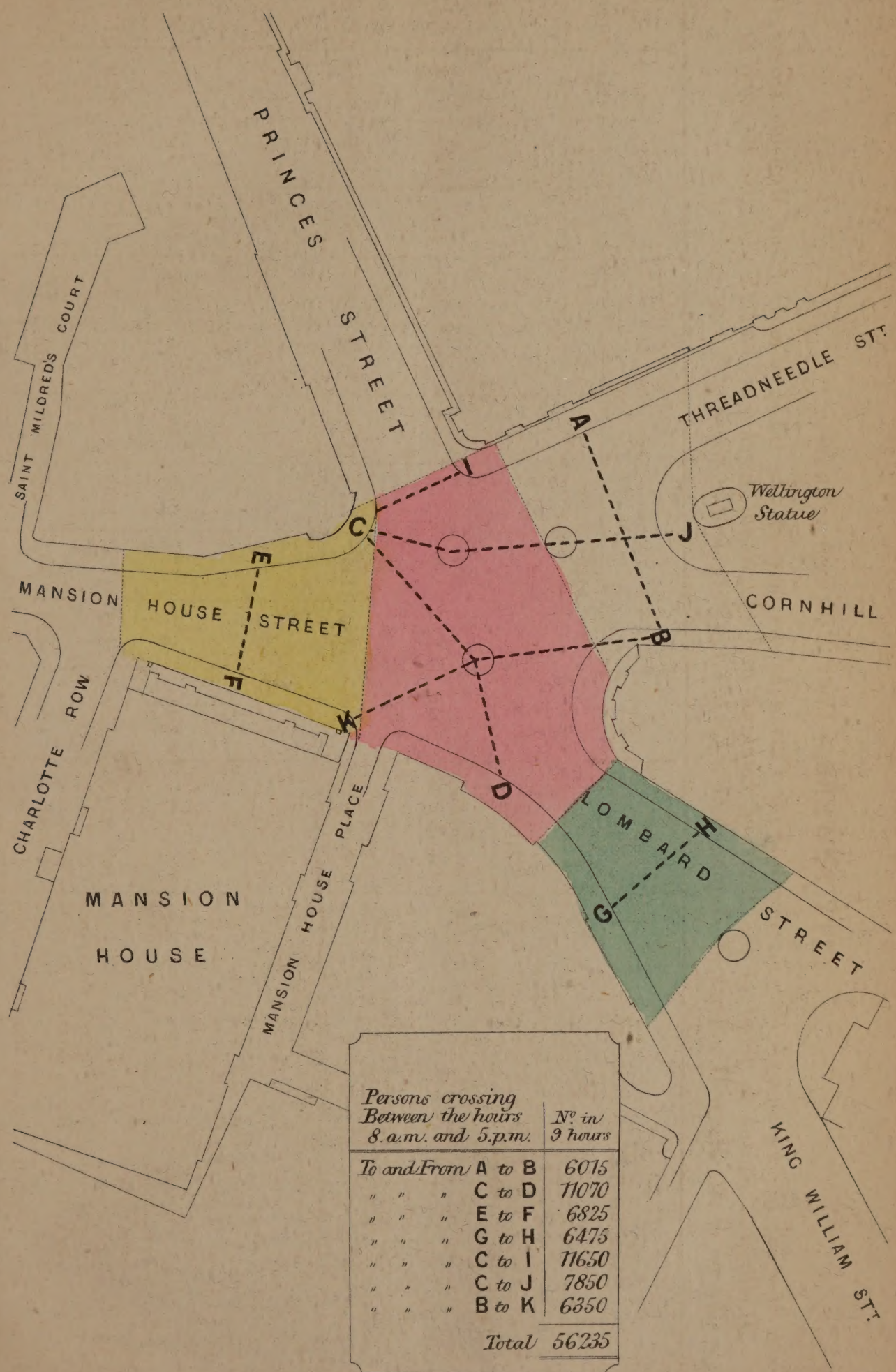
ACCIDENTS IN THE CITY.



SUMMARY FOR THE YEAR,

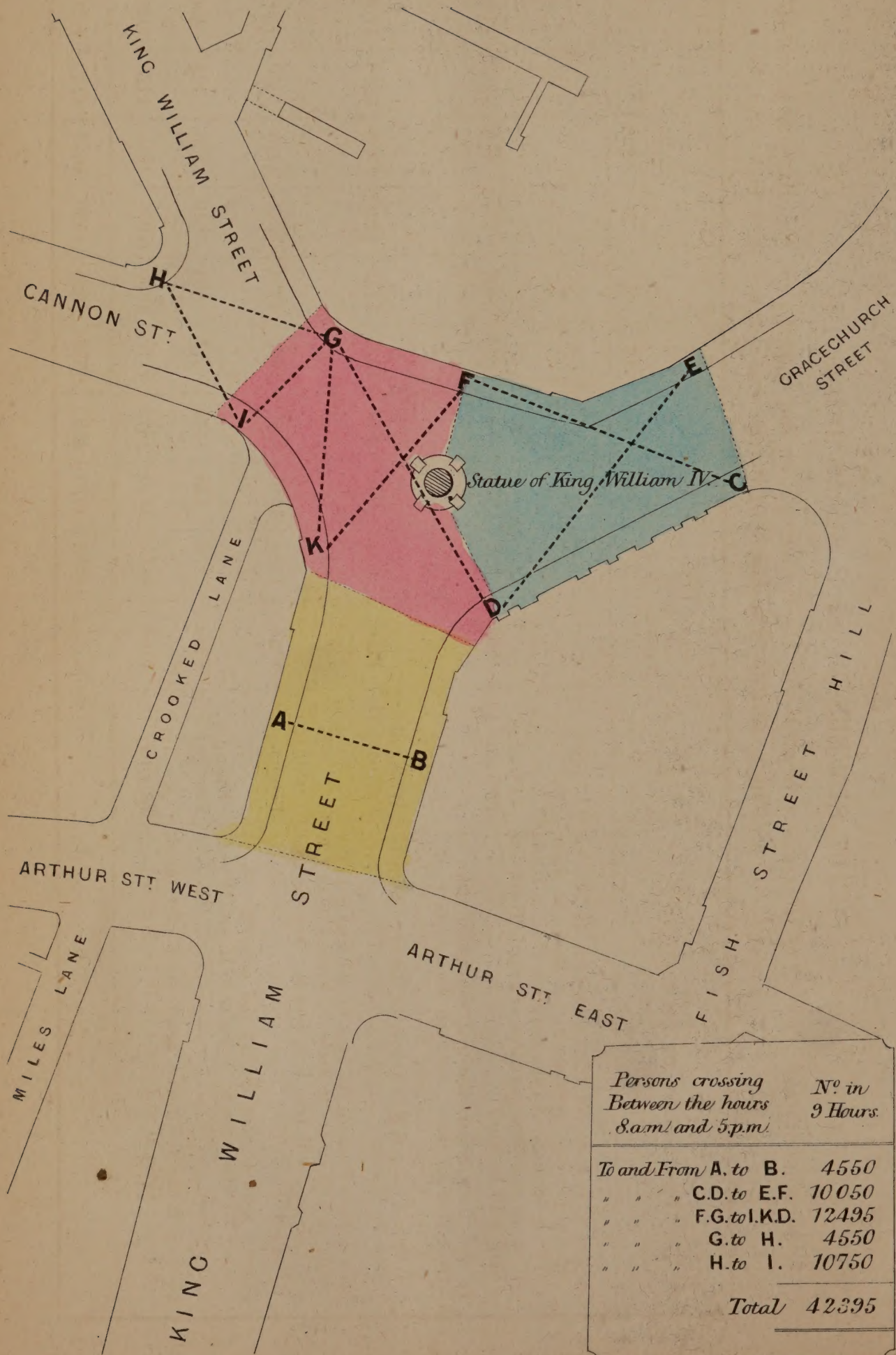
(Ending 30th September, 1862.)

Died from Injuries	5
Severely Injured	54
Slightly Injured	93
Not Injured	13
Injury not Reported	6
Total.....	<u>171</u>



Persons crossing Between the hours 8 a.m. and 5 p.m.			N° in 9 hours
To and From	A to B		6015
" " "	C to D		11070
" " "	E to F		6825
" " "	G to H		6475
" " "	C to I		11650
" " "	C to J		7850
" " "	B to K		6350
Total			56235

PLAN N° 2.



Persons crossing Between the hours 8 a.m. and 5 p.m.		N° in 9 Hours
To and From	A. to B.	4550
" " "	C.D. to E.F.	10050
" " "	F.G. to I.K.D.	12495
" " "	G. to H.	4550
" " "	H. to I.	10750
Total		42395

CITY SEWERS.—FOOT PASSENGER TRAFFIC.

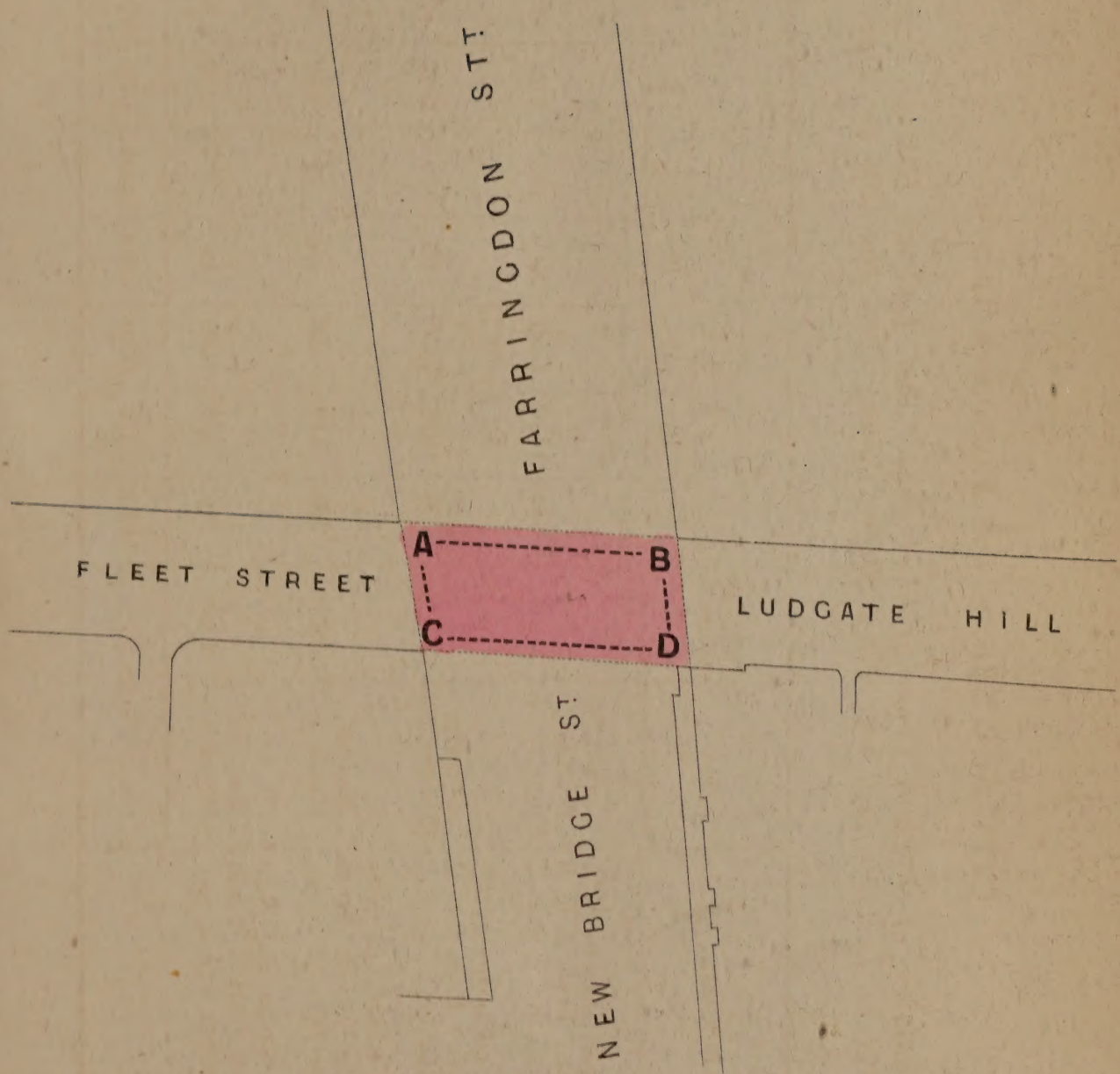
Table showing the number of Persons crossing the Carriageways in the vicinity of the King William Statue, London Bridge, between the hours of 8 A.M. and 5 P.M.

DESCRIPTION OF CROSSING.	Date.	State of Weather.	HOURS ENDING										Total of Nine Hours.
			A.M.					P.M.					
			9	10	11	12	1	2	3	4	5		
To and from East and West sides of King William Street, between Arthur Street and the King William Statue. In the direction of A to B and B to A and over the area coloured <i>Yellow</i> on Sketch Plan, No. 2	1863. Tuesday, February 10.	Fine.	325	550	525	625	525	525	475	550	450	4550	
To and from North-west and South-east sides of Gracechurch Street, between Fish Street Hill and the King William Statue. From C D to E F, and from E F to C D, over the area coloured <i>Blue</i> on Sketch	Wednesday, February 11.	Fine.	925	950	850	1025	1175	1425	1250	1300	1150	10050	
To and from Footway at back of the Statue to the Footway in front of Statue. From F G to I K D, and from I K D to F G, over the area coloured <i>Red</i> on Sketch	Friday, February 13.	Fine.	1250	1525	1575	1500	1375	1325	1275	1350	1300	12495	
To and from Cannon Street and opposite side of King William Street. From G to H and H to G on Sketch	Saturday, February 14.	Fine.	275	425	575	575	650	600	625	425	400	4550	
To and from North and South sides of Cannon Street. From H to I and I to H on Sketch ...	Monday, February 16.	Fine.	1475	1525	1075	1150	1200	1050	1050	1125	1100	10750	
Totals			4250	4975	4600	4875	4925	4925	4675	4750	4400	42395	

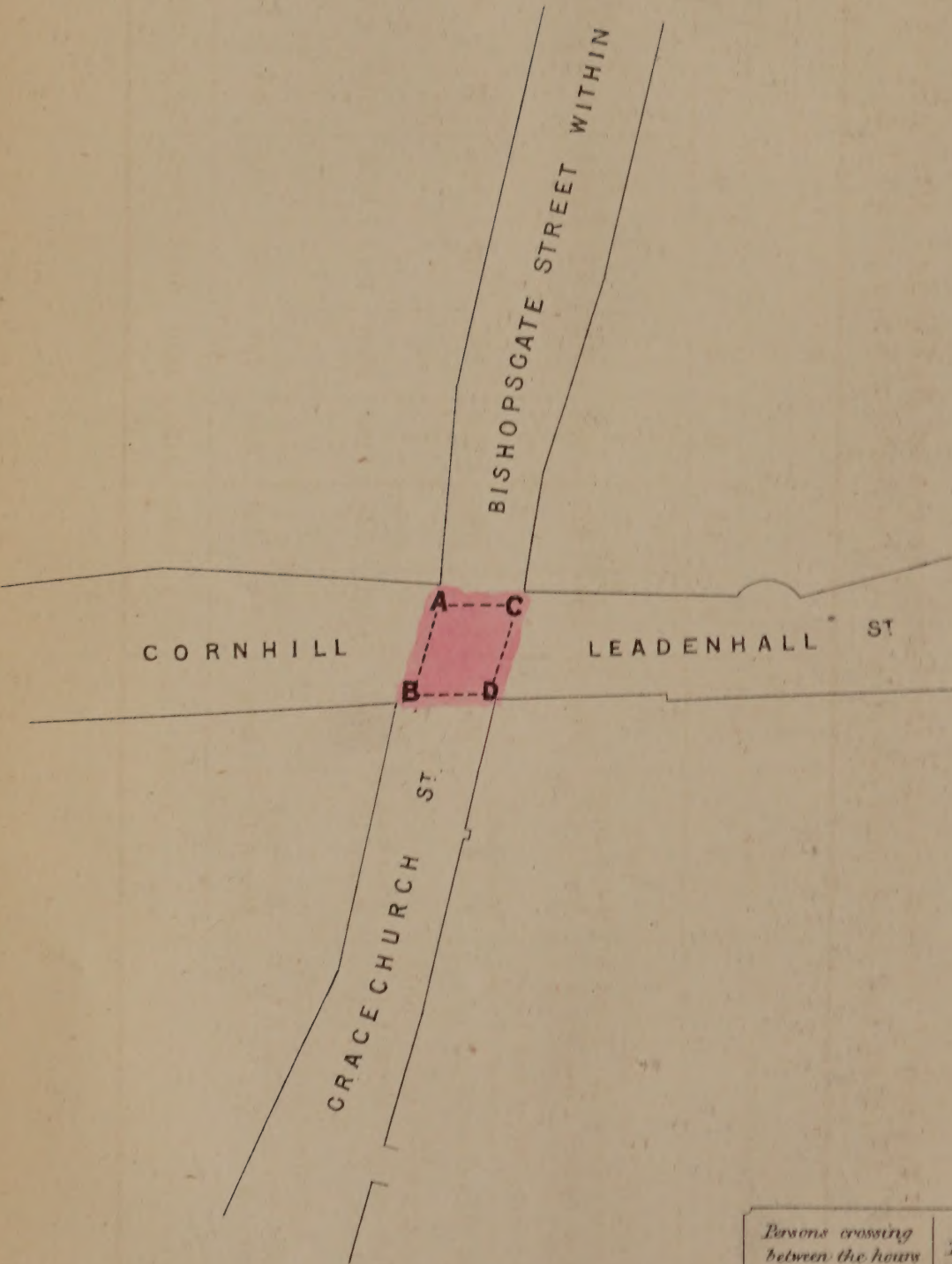
CITY SEWERS.—FOOT PASSENGER TRAFFIC.

Table showing the number of Persons Crossing Fleet Street and Ludgate Hill at Farringdon Street, and Farringdon Street at Ludgate Hill and Fleet Street, during each Hour of the Day, between the Hours of 8 A.M. and 5 P.M.

DESCRIPTION OF CROSSING.	Date.	State of Weather.	HOURS ENDING.										Total of Nine Hours.
			A.M.					P.M.					
			9	10	11	12	1	2	3	4	5		
To and from Fleet Street and Ludgate Hill, across Farringdon Street. From A to B and B to A on Sketch Plan, No. 3	1863. Saturday, February 28.	Misty.	650	1450	1580	2065	1985	2025	2050	2100	1975	15850	
To and from Fleet Street and Ludgate Hill, across New Bridge Street. From C to D and D to C on Sketch	Saturday, February 28.	Misty.	700	1075	1550	1450	1590	1770	1790	1675	1425	13025	
To and from Farringdon Street and New Bridge Street, across Fleet Street. From A to C and C to A on Sketch	Monday, March 2.	Fine.	390	410	500	535	450	650	445	470	505	4355	
To and from Farringdon Street and New Bridge Street, across Ludgate Hill. From B to D and D to B on Sketch	Monday, March 2.	Fine.	215	375	450	480	375	450	500	500	470	3815	
Totals			1955	3310	4080	4530	4400	4895	4785	4745	4375	37075	



<i>Persons crossing between the hours 8. a.m. and 5.p.m.</i>		<i>N° in 9 Hours</i>
<i>To and from</i>	A and B	15880
<i>" " "</i>	C " D	13025
<i>" " "</i>	A " C	4355
<i>" " "</i>	B " D	3815
<i>Total</i>		37075



<i>Persons crossing between the hours of 8 a.m. & 5 p.m.</i>		<i>Total of 9 Hours.</i>
<i>To & from</i>	<i>A and B</i>	5120
"	<i>C and D</i>	7530
"	<i>A and C</i>	10535
"	<i>B and D</i>	4895
<i>Total</i>		28080

CITY SEWERS.—FOOT PASSENGER TRAFFIC.

Table showing the number of Persons crossing the Carriageway of King William Street, between Arthur Street and the top of the steps on London Bridge, leading to the River.

HOUR ENDING	Friday, February 20th, 1863.	Monday, February 23rd, 1863.	Mean.	State of Weather.
9 A.M.	325	250	287	} Fine.
10 „	405	430	418	
11 „	380	395	387	
12 „	445	410	428	
1 P.M.	405	425	415	
2 „	380	415	398	
3 „	370	335	352	
4 „	365	435	400	
5 „	320	275	297	
Total of 9 hours ..	3395	3370	3382	

CITY SEWERS.—FOOT PASSENGER TRAFFIC.

Table showing the number of Persons descending the steps from London Bridge into Thames Street on one side, and re-ascending those on the other; during twelve hours, between 8 A.M. and 8 P.M.

DATE.	Number of persons passing in twelve hours ending 8 p.m.	State of Weather.
1862. October 28th. Tuesday.	63	Fine.



REPORT

TO THE

HONOURABLE THE COMMISSIONERS OF SEWERS
OF THE CITY OF LONDON,

ON THE

RESULTS OF FURTHER EXPERIMENTS TO ASCER-
TAIN THE CONSUMPTION OF GAS

AT THE

PUBLIC LAMPS,

AND ON THE APPLICATION OF THE

CARBURETTING PROCESS,

AND ALSO ON CERTAIN COMPLAINTS OF THE

GREAT CENTRAL GAS COMPANY.

BY

WILLIAM HAYWOOD, ENGINEER,

AND

HENRY LETHEBY,

MEDICAL OFFICER OF HEALTH AND CHEMICAL EXAMINER OF GAS.

May the 29th, 1863.

LONDON :

PRINTED BY M LOWNDS, 148 $\frac{1}{2}$, FENCHURCH STREET, CITY, E.C.

1863.

*At a Meeting of the Committee upon General
Purposes of the Honourable the Com-
missioners of Sewers of the City of
London, at the Guildhall of the said
City, on Friday the 29th May, 1863.*

The annexed Report by the Engineer and
Chemical Examiner of Gas, was laid before the
Committee and read.

AND IT WAS ORDERED—

That the same be printed and a Copy be
sent to every Member of the Court.

JOSEPH DAW,
Principal Clerk.

REPORT
ON THE
CONSUMPTION OF GAS
AT THE
PUBLIC LAMPS, &c.

TO THE HONOURABLE THE COMMITTEE UPON
GENERAL PURPOSES OF THE COMMISSIONERS
OF SEWERS OF THE CITY OF LONDON.

SEWERS' OFFICE, GUILDHALL,
29th May, 1863.

GENTLEMEN,

The matters recently referred to
us in relation to the Public Lighting of the City of
London are as follows:—

First. The complaints of defective lighting made
by certain inhabitants of the City.

Secondly. The Report of the Great Central Gas
Company to the effect that they found the average

consumption of Gas at the Public Lamps within their district to be *more* than the contract quantity instead of *less*, as reported by your engineer.

Thirdly. The suggestion from the Company that their agents should be allowed to be present whenever further experiments as to the quantity of gas consumed at the Public Lights were made by the officers of the Commissioners.

Fourthly. The statement of the same Company that the carburating process caused the lanterns to be so blackened by smoke as to render it impossible to keep them clean without employing double the present number of workmen for the purpose.

First. *As to Defective Lighting.*—We have to remark that the complaints referred to us are solely from one district, namely, the vicinity of Size Lane, Pancras Lane, Well Court, and George Yard. In those localities the gas is carburetted in precisely the same manner as it is in the other districts of the City where there have been no complaints of defective lighting. We have therefore caused a circumstantial inquiry to be made into the condition of the Public Lights in those localities; and we have likewise ourselves conducted a personal examination of the matter. The results are, that although in one or two in-

stances there was undoubtedly a small deficiency in the quantity of gas supplied to the lamps, yet, on the whole, the amount of light in that district was quite equal to the average of any part of the City. In fact, it appears from the letter of the Great Central Gas Consumers' Company to the Commission, in January last, that at the very time the complaints were being made by the inhabitants of Well Court, the lamps of that locality were supplied by the Gas Company with 5·4 cubic feet of gas per hour. If this be true, there must not only have been the full amount of gas required by the inhabitants, but there must also have been the additional effect of the carburation, which should have been equal to 3 cubic feet per hour, making together a light equal to 8 cubic feet of gas from each lamp of the court. It is manifestly impossible to reconcile these discrepancies, or to determine the real ground of complaint.

With regard to the second point of reference, viz :—*the Report of the Great Central Company to the effect that their officers had found a much larger supply of gas to the Public Lamps than we had*, we have only to remark that our observations were made with great care, and with instruments that had undergone the most searching tests to insure their accuracy, and we believe that our results were in every particular correct.

It is very probable, however, that as a month elapsed between the time of our experiments and those of the Company, a very different condition of things existed; for independently of the circumstance that the burners may have been opened in the process of cleaning, or may have been changed altogether, there was a manifest improvement in the quantity of light in all parts of the City directly after the publication of our report. Without therefore, entering into any explanation of the probable cause of the difference in our results, we may safely say that no reliance can be placed on the comparative value of tests made at an interval of a month. In illustration of this we may refer to the results of our own more recent testings of the light at the public lamps on the 12th February last, when we continued, or rather repeated the observations which we made in 1862.

The results of these observations are as follow:—

	February, 1863. Strength of Light.	
	Without Meters.	With Meters.
At Lamps with Carburators (3 cubic feet per hour } being the Contract supply)..... }	Yards. 6.53	Yards. 6.75
At Lamps without Carburators (5 cubic feet per hour } being the Contract supply)..... }	5.65	6.25

These results show that in February 1863, the difference in the amount of light from the Carburators which had meters and those which had not was only about 6 per cent., whereas in October, 1862, it amounted to 58 per cent. ; and in the case of the lamps without Carburators, the difference between those with meters and those without was, in 1863, but 22 per cent. ; whereas in 1862, it was 55 per cent. That is, in October, 1852, the lamps with meters gave, in each case about 58 per cent. more light than those without, whereas in February, 1862, the difference was only from 6 to 22 per cent.

We also ascertained that the Lamps with Carburators and *with* Meters, consuming nominally 3 cubic feet of gas per hour, gave a better light than the lamps *without* meters burning nominally 5 cubic feet per hour ; and that the lamps *with* Carburators gave more light than those *without* Carburators, (when compared under similar conditions in respect of meters,) instead of giving less light, as in 1862.

These observations were 56 in number, and were made like the former between the hours of 8.30 P.M. and midnight.

The differences between the light given at the

two periods, viz., 1862 and 1863, will be best seen by the subjoined Table:—

	STRENGTH OF LIGHT.		
	October 1862. Yards.	February 1863. Yards.	Per centage of increase, February 1863.
LAMPS WITH CARBURATORS—			
With Meters	5·512	6·75	50·06
Without Meters.....	4·378	6·53	123·24
Mean	4·945	6·64	86·65
LAMPS WITHOUT CARBURATORS—			
With Meters	5·925	6·25	11·46
Without Meters.....	4·758	5·65	41·48
	5·341	5·95	26·47

Thus the light from the Public Lamps has been largely increased in all parts of the City and under all conditions.

And it is important to notice that the light at the lamps where the gas was carburetted was very much stronger (nearly 25 per cent. stronger) than that at the other lamps where the gas was not carburetted, although, in the first case, only 3 feet of gas per hour is consumed, and in the second 5 cubic feet of gas per hour is the contract quantity.

It should be here stated, that upon the 1st of February the Commission, by its own agents, undertook and has since applied the Carburetting

process, and therefore it is probable, that much of the increase in luminosity in the district of the Great Central Gas Company, is due to the care with which that process is now carried out; but we nevertheless have no doubt that a better supply of gas has been everywhere given by all the Companies, in fact the increase of light in the district supplied by the Chartered Company can only be ascribed to an increased consumption of Gas.

3rdly. *As regards the request of the Company that their agents should be present at the time when your officers are making their examinations*, we are of opinion that however desirable it is to have their assistance in the inquiry, there are almost insuperable objections to it; for, in the first place, it would be necessary to give the Company some hours notice of your intention to make experiments, and this, undoubtedly, would give uncertainty to the results, if, indeed, it did not altogether frustrate the object of the inquiry; and in the next place, it would be almost impossible to make a sufficient number of experiments in the course of a night, if every experiment had to be repeated again and again for the satisfaction of those who were looking on.

There is but one way, indeed, in which the difficulty may be met, and that is by testing the burners

at given pressures. This, however, would hardly secure reliable results, for, at the lamp, the consumption of the burner is dependent not only on the pressure in the main, but also on the extent to which the tap is turned, and on the condition of the burner. If, therefore, this process were followed, it must be with a stipulation that the pressure at the burner is uniform, and that the tap is always turned full on.

4thly. *With respect to the complaint by the Company that the Carburetting process had caused the deposit of soot upon the lanterns, and had obscured the light, and had given rise to increased labour in keeping the lanterns clean,* we are satisfied that this only occurred at the time when a new and better quality of naphtha was first supplied to the Carburators. With the old naphtha it had been found necessary in some cases to increase the light by using a cap upon the burner. This had the effect of checking the supply of air to the flame, and, therefore, of hindering the oxidation of the carbon in the naphtha, and so of increasing the amount of light; but when the new naphtha was used, it was so rich in carbon that the caps prevented the proper degree of oxidation, and the carbon escaped in an unburnt condition, and was deposited upon the glass of the lanterns. Nothing, however, was easier than the remedy for this; for

when the caps were removed, and care was taken that the burners were sound, and of proper discharging capacity, the flame was brilliant and free from smoke.

We believe, however, that the matter has been somewhat exaggerated, for while the Gas Company asserts that about a hundred lanterns were blackened in this manner in a single night, the Inspectors report there were not above twenty in such a condition in all the City; and as there are 1727 lanterns in the district supplied by the Company, at which the Gas is carburetted, it is manifest that the proportion of blackened lanterns was very small. Besides which we are of opinion that the specimen produced by the Company was a very extreme example of the mischief complained of, and was calculated to give the Commission a very erroneous idea of the nature of the complaint.

It seemed to us that the question which had been thus raised by the Company, deserved further investigation. Instructions were therefore given to the Inspectors of Pavements to report regularly on the cleansing of the Street Lamps. From that time to the present they have informed us whenever the lanterns were cleaned; and the result of this systematic supervision is that the lamps are in a

much more cleanly state than we have ever before observed.

Having thus reported on all the points referred to us, we beg leave to remark that the great labour bestowed upon this subject by the Commission, and the searching inquiries, and experimental investigations, which they have caused to be made, have resulted in a far more satisfactory condition of the public lighting of this City, and perhaps of the whole metropolis, than has been witnessed for many years past. As a matter of economy, and also of satisfaction to the public, one thing is yet wanted, and that is the means of securing and maintaining with the utmost certainty the proper supply of Gas to the Public Lamps: this can only be done by the use of a meter, and by the Commissioners taking the entire charge of the Public Lighting.

We have the honour to remain,

GENTLEMEN,

Your most obedient Servants,

WILLIAM HAYWOOD,

Engineer.

HENRY LETHEBY,

Medical Officer of Health and Chemical Examiner of Gas.

19 176

REPORT

TO THE

HON. THE COMMISSIONERS OF SEWERS OF
THE CITY OF LONDON,

UPON AN APPLICATION OF THE

PNEUMATIC DISPATCH
COMPANY,

TO LAY A TUBE THROUGH

HOLBORN, SKINNER STREET, & NEWGATE STREET.

BY

WILLIAM HAYWOOD, M. INST^T. C.E., F.R.I.B.A.,

ENGINEER AND SURVEYOR TO THE COMMISSIONERS.

Ordered to be Printed, 17th November, 1863.

LONDON:

PRINTED BY M. LOWNDS, 148 $\frac{1}{2}$, FENCHURCH STREET, E. C.

1863.

*At a Meeting of the Commissioners of
Sewers of the City of London, held
at the Guildhall, of the said City, on
Tuesday, November 17th, 1863:—*

HENRY DE JERSEY, Esq., *Deputy*, in the Chair.

*The Surveyor laid before the Court the following
Report, which was ordered to be printed, and
a copy thereof sent to every Member of the
Court.*

JOSEPH DAW,

Principal Clerk.

REPORT

UPON AN APPLICATION OF THE

PNEUMATIC DISPATCH COMPANY,

TO LAY A TUBE THROUGH

HOLBORN, SKINNER STREET, & NEWGATE STREET.

TO THE HONOURABLE THE COMMISSIONERS OF
SEWERS OF THE CITY OF LONDON.

SEWERS' OFFICE, GUILDHALL,

17th November, 1863.

GENTLEMEN,

I beg to report, in reference to the notice of the Pneumatic Dispatch Company, that the Company appears to have powers to lay down tubes within the City (subject to certain control or direction on the part of the Commission under the Pneumatic Dispatch Company's Act, 22 & 23 Victoria cap. 37).

The notice served upon the Commission is to the effect that the Company intends laying down a Pneumatic Tube from their Holborn Station "to a Station to be established at or near the end of the General Post Office, in St. Martin's-le-Grand."

Upon inquiry, I find that a Pneumatic Tube already exists between the North Western District Post Office, in Eversholt Street, and the Euston Station of the London and North Western Railway, and that the letters have been carried between those points from the 1st February last, and that it is now proposed to lay a Tube from that Station, through Woburn Place, Southampton Row, and King Street, to Holborn, and thence along Holborn, Skinner Street, Newgate Street, and St. Martin's-le-Grand, to a Station in that portion of the yard of the General Post Office which is nearest to Gresham Street.

This Tube is to be of cast iron, 4 feet high and 4 feet 6 inches wide, internal dimensions. At the City boundary it is to be 11 feet 6 inches deep, at Hatton Garden 18 feet 6 inches deep, its depth then decreases, and it passes *over* the Fleet Sewer at a depth of 6 feet; it then is kept low down, and passes *under* the London Chatham and Dover Railway; and at the West end of Newgate Street

it is 25 feet deep, at the East end 14 feet deep, and its mean depth in St. Martin's-le-Grand is to be 12 feet.

When completed, it is anticipated that the transmission of all letters in bulk, between the General Post Office and the North Western Railway will be effected by its agency, and that large parcels of goods will be also forwarded by it, inasmuch as the Company states that it already has entered into arrangements with Messrs. Pickford and Company to forward parcels from their premises in Gresham Street to the North Western Railway, and an extension of the tube into their premises is ultimately contemplated.

Upon further investigation, it also appears that this line of tubing is but the commencement only of a system which ultimately is to be extended to the various Metropolitan Railway Stations, and probably to connect with all the District Post Offices in the Metropolis.

Having thus briefly described the intentions and anticipations of the Company, it may be sufficient to observe that, assuming the pneumatic system to work satisfactorily, it is probable that it will become a valuable aid to the commerce of the

City, and with regard to the point upon which the Commission is specially interested, that it may be the means of freeing the streets of much goods-traffic, and will in that respect also be of public benefit.

The laying of this tube through the crowded streets of the City will cause the greatest public inconvenience, for its size is that of a large sewer, and its depth must be greater than that of the sewers in the streets, inasmuch as it cannot be allowed to interfere with the house drains; the excavation will, therefore, be considerable, and, as the work must be performed with great care, so the time occupied will likewise be considerable. The present occupation of the surface by gas, water, and telegraph pipes will, it is feared, preclude the possibility of its being laid at a less depth.

The inconvenience will be most felt in Newgate street, for, whilst the work is in progress, it will be scarcely possible to allow the traffic to pass in both directions; and this remark may, perhaps, apply also to Skinner Street.

Such, however, are the conditions of the main thoroughfares in and surrounding the City, that I

am unable to suggest any other line through which the Company can lay its tube in lieu of Holborn, so as to lessen the public inconvenience in that thoroughfare whilst the work is in progress.

It is possible that the Company might lay a line through Giltspur Street, Smithfield, and Little Britain, or else up Snow Hill, King Street, and Smithfield, and thence by Little Britain to the Post Office, thus avoiding Skinner Street and Newgate Street; but it must be admitted that the narrowness of the thoroughfares suggested, the great depth and character of the sewers, and other conditions, will make the laying of the tube through them a matter of extreme difficulty at the present time, and works now contemplated by the Metropolitan, and London Chatham and Dover Railways may make it almost an impossibility at a future day.

But should the exigencies of the pneumatic system and the conditions of the streets named by me not admit of either of those lines being taken, there is no other course but to lay it in Newgate Street, unless permission could be obtained to lay it through Christ's Hospital; the plan of the property of that institution is such that the tube might

enter it at Giltspur Street and pass direct through the open spaces to King Edward Street and Angel Street, and thence to the Post Office area in St. Martin's-le-Grand.

The Company could only obtain the right to do this by negotiation, for it has no power to enter or obtain private property compulsorily, the legislature manifestly contemplating that these tubes should be laid in the public streets; and it is only on account of the great public inconvenience which must accrue by the occupation for a long period of a large portion of the important thoroughfares mentioned, which induces me to make the suggestion. I am informed that when the tube is once laid, many years may elapse before it will require to be touched for repairs, and that all repairs may be made from the inside of the tube.

Whichever direction the tube may take within the limits mentioned, it will in a degree interfere with and add expense to the projected works of the Holborn Hill and Skinner Street improvement.

The notice of the Company brings, indeed, into strong light the great occupation of the surface of the public ways and the equally close occupation

of the soil beneath them, the necessity for increased accommodation for the commerce of the City and the increasing and conflicting difficulties which interpose between that necessity and its relief.

After due consideration, all I can recommend the Commission is to request the Company to reconsider the line from the Fleet Valley to the Post Office, and, in the meanwhile, to continue its dissent to the line proposed by them.

I have the honour to remain,

GENTLEMEN,

Your most obedient Servant,

WILLIAM HAYWOOD,

Engineer and Surveyor.

REPORT

OF THE

WORKS EXECUTED

BY THE

HON. THE COMMISSIONERS OF SEWERS

OF THE

CITY OF LONDON,

DURING THE YEAR 1863.

BY

WILLIAM HAYWOOD, M. INST. C.E., F.R.I.B.A.,

ENGINEER AND SURVEYOR TO THE COMMISSION.

January 26th, 1864.

LONDON:

PRINTED BY M. LOWNDS, 148 $\frac{1}{2}$, FENCHURCH STREET, E. C.

1864.

REPORT

WORKS EXPENDED

IN THE CITY OF LONDON

FOR THE CONSTRUCTION OF STREETS

IN THE

CITY OF LONDON

FOR THE YEAR 1868

BY

WILLIAM BAYWOOD, M. INST. C.E.

AND AS SUPERVISOR TO THE COMMISSION

LONDON: 1868

PRINTED BY

WILLIAM BAYWOOD

LONDON

AND AS SUPERVISOR TO THE COMMISSION

1868

*At a Meeting of the Commissioners of
Sewers of the City of London, held at
the Guildhall of the said City, on the 26th
day of January, 1864:—*

The Engineer and Surveyor laid before the
Court a Report as under:—

ORDERED—

That the same be printed, and a copy be sent to
every Member of this Court.

JOSEPH DAW,

Principal Clerk.

REPORT

OF THE

WORKS EXECUTED BY THE HONOURABLE
THE COMMISSIONERS OF SEWERS

OF THE

CITY OF LONDON,

DURING THE YEAR 1863.

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REPORT

OF THE

WORKS EXECUTED BY THE HONOURABLE
THE COMMISSIONERS OF SEWERS

OF THE

CITY OF LONDON,

DURING THE YEAR 1863.

TO THE HONOURABLE THE COMMISSIONERS OF
SEWERS OF THE CITY OF LONDON.

SEWERS' OFFICE, GUILDHALL,

26th January, 1864.

GENTLEMEN,

I beg to lay before you my Report upon the works you have executed, and upon your transactions generally, during the year 1863.

SEWERS.

The total length of new Sewers built was 1,772 feet, of which 1,597 feet were reconstructed upon the line of old sewers.

HOUSE DRAINAGE.

The total number of premises drained during the year 1863 was	193
The approximate number of premises known to be drained at the end of the year 1862, was.....	13,355
The total number of houses, of which some record is now possessed as to their being drained, is about	13,548
The approximate number of premises, about the drainage of which nothing is known, and which have hitherto been set down as undrained, is about.....	2,453

It is, however, known that in some way the 2,453 houses drain into the public sewers, although there is no record as to the nature of the drainage.

HOUSE DRAINAGE PLANS.

During the year, 142 plans, which show the drainage of 193 houses, were made; nearly one-half of the plans were for the drainage of new premises.

IMPROVEMENTS.

The frontages of Nos. 100, 102, 103, 104, 105, Fenchurch Street, were set back; this is the com-

mencement of the improvement at the eastern end of that street. The northern end of Lime Street was slightly widened; the improvement in Upper Thames Street was continued by throwing back the front of Rutland Wharf; the premises on the south side of Little Carter Lane, next to Knight Rider Court, were set back; Tower Street from Tower Hill to Seething Lane was widened, and the entire length of Barking Alley and Barking Passage were also made nearly double their former width.

The freeholds of Nos. 54, 55, 56, 57, 58, Great Tower Street, have been purchased with the view to completion of the widening of that thoroughfare, between Mark Lane and Tower Hill, and the frontage of the property between Nos. 148 and 151 Upper Thames Street, inclusive, arranged to be set back; arrangements are also made for setting back the frontages of the houses Nos. 47, 48, 49, St. Mary Axe, No. 60, Gracechurch Street, and Nos. 4, 6, and 8, St. Dunstan's Hill.

Negotiations are pending either for the purchase of the whole or portion of the houses, from Nos. 67 to 73, Newgate Street, inclusive; No. 12, Little Knight Rider Street; for property at the north-east angle of Threadneedle Street; No. 16, St. Martin's-le-Grand; for portion of No. 35, St. Paul's Churchyard; for widening Church Passage, Gresham Street, and for widening Dowgate Hill.

The opportunity offering, by the pulling down of the premises known as Sir John Lubbock's Bank, upon the northern side of Mansion House Street, the Commission projected an improvement in that thoroughfare. After a protracted deliberation and negotiation, it resulted in the owners demanding a very large sum of money for the ground required. The Commission offered to carry out the improvement under the powers of their Act, and to contribute one-half of the cost, provided the Metropolitan Board of Works would contribute the other half; this the Board of Works declined to do, and the negotiation for this most important public improvement has been abandoned.

When churchyards have been situated in thoroughfares for which lines of improvements have been laid down, the Commission has, in most recent cases, been cheerfully assisted by the Ecclesiastical and Parochial Authorities in throwing the area of ground needed into the public way. The proceedings in relation to the churchyard of Allhallows Barking, are the latest illustration of this; for, by the willing co-operation of the authorities of that parish, Tower Street has for a considerable length been widened from 20 feet to 37 feet, Barking Alley from 8 feet to 15 feet, and Barking Passage from 6 feet to 12 feet in width. Indeed, about one-third part of the whole of the churchyard has been

thrown into the public ways. Some alterations were even permitted to be made in the church itself, as a portion of that structure stood in the way of the improvement, the Commission being merely put to the expenses which were actually necessary to effect the various alterations.

The Commission has experienced very different treatment in another part of the City. In furtherance of their plan, they recently purchased some ground upon the north side of Thames Street, opposite to the churchyard of Allhallows the Less. Now the plan for the improvement of that thoroughfare requires that a very small portion of that churchyard should also be thrown into the public way, a request was therefore made to the parochial authorities for their aid in obtaining the ground—the Commission offering, according to custom, to set back the railings and to pay all expenses needful to obtain the consent of the various interests; in brief, not to put the parish to one farthing expense in the matter.

A demand was, however, made by the parochial authorities for a sum of money to be paid, over and above the expenses which the Commission was willing to take upon itself; and as the Commission would not consent to such conditions, the negotiation has ceased. Thus, it appears that a useless churchyard is to remain in the way of a

public improvement, unless the Commission consents to pay for the ground as if it was the property of a private owner, who could let it for building purposes.

SURFACE CLEANSING AND REMOVING DUST FROM PREMISES.

The contracts for scavenging and dusting were let from Midsummer 1863 to Midsummer 1864, for £8,260, which was £155 less than the letting of the previous year. The variation in the gross amount of tenders for this work has been but slight for the last five years.

The work was, upon the whole, exceedingly well performed, and less fines were inflicted by the Commission than is usually the case.

STREET SURFACE WATERING.

The contracts were let at £1,443, being £78 more than the previous letting. The work was satisfactorily performed.

PAVEMENTS.

The triennial contracts were let in the month of March, the Commission having adopted different

conditions from those which had been acted upon for many years previously.

Ludgate Hill and Ludgate Street were paved with new stone.

Leadenhall Street, Mansion House Street, and the south, east, and west sides of St. Paul's Church Yard were re-laid, and about one-third of their areas respectively being laid with new stone.

Owing to the large amount of pipage laid during the year by the different gas and water companies in the main thoroughfares of the City, some of the works of the Commission were driven to a late period, and it was necessary to postpone the execution of others until the present year.

The Fleet Stone Yard has been given up, owing to the works of the London, Chatham, and Dover Railway. This yard, which, by the kindness of the Corporation, has been for so many years used by the Commission, free of cost, was, from its situation and area, of great utility, and its loss will tell upon the cost of future paving works.

The Iron Carriage-way Pavement, laid in the Poultry in April 1862, in connection with iron trams, was considerably worn at the point of junction with them; it was accordingly re-laid in December, the trams being for the sake of expedition removed, and the Cellular Iron Pavement laid

up to the drawing stone; the trams removed are to be laid in another thoroughfare.

URINALS.

One was constructed in Mansion House Place, capable of accommodating nine people.

One also was erected in Borer's Passage to accommodate two persons.

The cost of water supply for, and the maintenance of the public Urinals now forms a large item of expense to the Commission.

PUBLIC LAMP LIGHTING.

The public lighting was carried out during the year upon the terms described in my last Annual Report. The North District being lighted by the Chartered Gas Company, by burners consuming five cubic feet of gas per hour; the South District being lighted by the Great Central Gas Company, with three-feet burners. The Commission, by its own agents, carburetting the gas in the Southern District.

As the public gas lighting of the City has been from time to time the subject of special reports by Dr. Letheby and myself during the year, it is needless to dilate upon it here. It will be sufficient to observe, that the lighting has, upon the whole, been

better than it has been for some years past, and that the efficiency of the carburation, when the full quantity of gas is given, and the proper supply of naphtha afforded, has been placed beyond doubt.

The complaints have also not been so numerous, although there, nevertheless, have been complaints of the usual character which have been now made for some years past, and I am more firmly convinced than ever, that the only way to obviate these complaints (looking at the present situation of the City with regard to its gas supply) is, for the Commission to take the entire charge of the lamp lighting, to affix meters to the lamps, and pay the Companies for the quantity of gas consumed. By this course I think the Commission will be a gainer pecuniarily, although I hold no strong opinion to that effect; but, whatever the result may be in a pecuniary point of view, it is the only mode which can, under present circumstances, be adopted, and to set at rest the constant complaints which have been made for so many years past, and satisfy the public that the full supply of gas is given.

The Commission requested tenders from the Companies supplying the City for the year commencing the 1st February, 1864; specifications of conditions being prepared as usual. The Companies took no notice of these specifications, but stated they tendered under the conditions of the Metropolis Gas Act.

The tenders sent in were as follows:—

GAS LIGHTING, 1864.

NAME OF COMPANY TENDERING.	Description of Burner.	At per Lamp per Annum.	Lighting, Extinguish- ing, and Repairing Lanterns, at per Lamp per Annum.	Transfer- ring services at Lamp.	Total per Lamp (not including transfer of services).
NORTH DISTRICT.		£ s. d.	£ s. d.	£ s. d.	£ s. d.
Great Central Gas } Consumers' Co. }	3 ft.	2 17 6	0 15 0	0 10 0	3 12 6
„ „ }	5 ft.	4 13 6	0 15 0	0 10 0	5 8 6
Chartered Gas Com- } pany }	2 ft.	1 18 0	0 15 0	....	2 13 0
„ „ }	2½ ft.	2 9 6	0 15 0	....	3 4 6
„ „ }	3 ft.	2 18 6	0 15 0	....	3 13 6
„ „ }	4 ft.	3 16 0	0 15 0	....	4 11 0
„ „ }	5 ft.	4 14 6	0 15 0	....	5 9 6
SOUTH DISTRICT.					
Great Central Gas } Consumers' Co. }	3 ft.	2 17 6	0 15 0	0 10 0	3 12 6
City Gas Company ..	3 ft.	3 14 0		0 10 0	3 14 0

The tender of the Great Central Gas Company was accepted for the South District; that of the Chartered for the North.

It will be seen that the charges of the Chartered Gas Company were exactly the same as those of the previous year; that the charges of the Great Central Company and the City Gas Company were slightly increased.

TENDERS FOR	3-FEET BURNERS.		5-FEET BURNERS.	
	Including Lighting, Extinguishing, and Maintaining.		Including Lighting, Extinguishing, and Maintaining.	
	1863.	1864.	1863.	1864.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
City Company	3 11 6	3 14 0	5 9 6	No Tender
Great Central Company	3 9 8	3 12 6	5 6 0	5 8 6
Chartered Company	3 13 6	3 13 6	5 9 6	5 9 6

The expense of public gas lighting is gradually augmenting, as will be seen by the subjoined Table:—

	1855.		1856.		1859.	
	3-feet Burners.	5-feet Burners.	3-feet Burners.	5-feet Burners.	3-feet Burners.	5-feet Burners.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Chartered Company....		2 19 6	....	4 2 0	....	4 8 0
Great Central Company		3 3 0	....	4 4 0	....	4 10 0

	1862.		1863.		1864.	
	3-feet Burners.	5-feet Burners.	3-feet Burners.	5-feet Burners.	3-feet Burners.	5-feet Burners.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Chartered Company....	....	4 14 6	....	5 9 6	....	5 9 6
Great Central Company	3 0 0	....	3 10 0	....	3 12 6	

These charges include the expense of lighting, extinguishing, and maintaining.

By the adoption of the carburetting process in the South District, during the year 1863, the Commission saved about £1,000 under the head of Gas Lighting.

The process is to be adopted in the South District for the present year, and as the charges for the carburation will be less than last year, the saving effected will be greater.

If the Commission lighted, extinguished, and had the sole charge of the lamps, the saving by the adoption of this process would be still greater.

Your Engineer at the request of the Commission prepared designs for a new form of gas column, some of which were placed subsequently in various parts of the City; they are so designed as to hold within their bases meters, carburators and regulators, and afford means of clearing the service pipes from naphthaline without disturbing the pavements.

New five-light lamp standards were also designed by him and two fixed in the large space of public way opposite the Royal Exchange, and the Mansion House.

WATER SUPPLY.

The amount paid by the Commission this year for Water was as follows:—

For supply to Urinals	£340	0	0
For flushing Sewers	23	14	6
For washing Courts	146	9	4
For Drinking Fountains	28	0	0
Total	£538	3	10

This total does not include the money paid indirectly by the Commission for surface watering.

DANGEROUS STRUCTURES.

The business transacted by the Commission under the Metropolitan Buildings Act, may be gathered from the following summary of cases:—

Number of Structures reported upon by the Surveyors appointed by the Commission	97
Number of cases heard before the Magistrate	6
Number of buildings shored up during the year	5
Number of cases certified by the Surveyors as being completed	92

These numbers do not differ materially from those of the year 1862.

DRINKING FOUNTAINS.

No additional fountains were erected during the year. There are but five within the jurisdiction of the Commission.

HOUSE INSPECTION AND REMOVAL OF NUISANCES.

From the return prepared by your Principal Clerk, it appears that during the year 9,256 inspec-

tions of houses were made by the District Inspectors under the direction of your Medical Officer of Health, and, consequent upon their reports, the following notices were issued:—

For works of drainage	15
For preventing the issue of waste water upon the surface of pavements	56
For lime-whiting and cleansing the in- terior of premises	1,164
Total	<u>1,235</u>

SLAUGHTER-HOUSES.

The number of Slaughter-houses existing in the City is now 60, being 5 less than at the end of 1862.

COW-HOUSES.

The number of Cow-houses is now 20, being 1 more than at the end of 1862.

LODGING-HOUSES.

The number of houses upon the Register is 135, being an increase of 5 upon the registration of the previous year.

CITY CEMETERY.

The number of interments in the Cemetery, during the year 1863, was 6,159; being 2,764 less than the previous year; the reduction in number is attributable to the following circumstances:—

When the Tables of Fees and Regulations for the Cemetery were originally framed, the Commission established the charges to the poorer classes at an exceedingly low rate, with the object of relieving them as much as possible from the pecuniary difficulties so frequently experienced when deaths occur in their families; an additional reason, also urged in support of this arrangement, was the fact, that in the local rates paid by them, they contributed to the cost of the formation of the Cemetery.

There was, however, no exclusion provided by the Regulations. In the course of time this became generally known, and the extra civic parishes of the Metropolis availed themselves of the ground, thus overwhelming the Cemetery with business of an utterly unremunerative character, and gradually, but rapidly, filling up the ground which had been laid out at such cost.

The Commission, therefore, revised the Table of Fees, submitted it to the Secretary of State, and received his approval of it. By the revised table the advantages of the former table are still retained

by the parishioners or inhabitants of the City; but to non-parishioners a slight increase has been made.

The effect has been to cause a great reduction in the number of interments of the poorest class, which previously were sent from the Metropolitan parishes, but there has concurrently been a considerable increase in the number of interments in private graves; owing to which, and the augmented fees, the Cemetery receipts are actually larger than they were the previous year, although there were 2,764 fewer interments in it than in 1862.

MISCELLANEOUS.

In the commencement of the year there were seven different projects for Railways and other works, for which bills had been deposited, and which affected the City of London. Those which passed the Legislature were: The Metropolitan Railway Act, which was simply to increase the area of land for station purposes; the Acts for the construction of the New Blackfriars Bridge, and the formation of the new street from Blackfriars to the Mansion House.

The provision of means of crossing securely over the main thoroughfares of the City, which, owing to the enormous traffic, is now a matter of much difficulty, was reported upon by your Engineer, and

the Commission, after due deliberation, decided that neither subways nor bridges (the expediency of the construction of which was fully considered) were likely to be sufficiently used to compensate for their expense and other objections.

The Pneumatic Dispatch Company gave notice of their intention of laying a pipe, at a very great depth through Holborn, Skinner Street, and Newgate Street, to the Post Office. The laying of this tube will necessarily cause the extremest public inconvenience, and the Commission has up to the present time withheld their sanction to a portion of the line.

The Company is applying to Parliament for further powers, and the matter will most probably be settled during the coming Session of Parliament.

The question of the assistance that might be given to the Commission by the police was again raised during the year, and the Police Committee, upon application being made to them, expressed their willingness to co-operate with the Commission.

The assistance that the Commission sought of the Police was arranged under the following heads:—

1. In removing from and in keeping clear the highways from all goods or moveable projections which may be placed upon or over them.

2. In preventing the placing of building or other materials upon the highways, where special license to do so has not been granted by the Commission.
3. In seeing that the householders daily and properly cleanse the footways in front of the houses.
4. In preventing the householders or others from sweeping or throwing dust and rubbish out from shops or premises on to the highways.
5. In reporting immediately, when noticed, all holes which may become dangerous by the subsidence or falling in of the pavements.
6. In reporting the hours at which the contractors cleanse the streets.
7. In preventing the offence of sweeping mud, dust, rubbish, or other improper matters down the street gullies, ventilating shafts, or other openings connected with the sewers.
8. In preventing bill sticking in the Public Urinals, or the defacing or injuring of the Public Urinals.
9. In reporting daily any defects in the Public Lighting which may have been observed during the previous night.
10. In reporting the issue of opaque smoke from furnace chimnies.

At a subsequent period Lieut.-Colonel Fraser, Commissioner of City Police, expressed his willing-

ness to aid the Commission under the foregoing heads, and it may be confidently anticipated that much public benefit will arise from his co-operation with the Commission.

The supervision of the Meat Markets has been very stringent; it appears from the return of your Principal Clerk that as much as 19,874 stone of meat unfit for human food has been seized and condemned by your Inspectors.

The senders and sellers of diseased meat have been in many cases successfully prosecuted; they have mostly been fined heavily, and in four cases have been imprisoned, and the law has reached offenders at very remote parts of the kingdom.

The Bakehouse Regulation Act 1863, became operative upon the 1st of January, the enforcement of the Regulations within the City was by the Act confided to the Commission. During the year your Medical Officer investigated and reported upon the subject. From his Report, it appeared that there were 141 bakehouses in the City; that 101, or rather more than two-thirds of them, were underground, the rest being on a level with the street; that 51, or about one-third of the whole number, were in a filthy condition; in four cases the ventilation was imperfect, and in one case the bakehouse was used as a sleeping place. Notices were therefore served in

accordance with the provision of the Act upon the owners of the 57 places which were not in compliance with the Act, and the remedies are now being applied under the supervision of the Medical Officer.

I have the honour to remain,

GENTLEMEN,

Your obedient Servant,

WILLIAM HAYWOOD,

Engineer and Surveyor.

REPORT

TO THE

COMMITTEE UPON IMPROVEMENTS

OF THE

HON. THE COMMISSIONERS OF SEWERS

OF THE

CITY OF LONDON

UPON THE

PROJECTS OF THE RAILWAY AND OTHER
COMPANIES, APPLYING TO PARLIAMENT
DURING THE SESSION, 1864,
FOR POWERS TO CONSTRUCT WORKS WITHIN
THE CITY OF LONDON.

BY

WILLIAM HAYWOOD, M.INS^T.C.E., F.R.I.B.A.

ENGINEER AND SURVEYOR TO THE COMMISSIONERS.

1st February, 1864.

LONDON:

PRINTED BY M. LOWNDS, 148 $\frac{1}{2}$, FENCHURCH STREET, E.C.

1864.

*At a Meeting of the Committee upon Improve-
ments of the Commissioners of Sewers of
the City of London, at the Guildhall, on
1st February, 1864:—*

The Report of the Engineer and Surveyor, here-
unto annexed, being read,

IT WAS ORDERED—

That the same be Printed, and a copy be sent
to every Member of the Court of Sewers and of
the Court of Common Council.

JOSEPH DAW,

Principal Clerk.

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APPENDIX.

Plan showing the various projects	
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REPORT

UPON THE

PROJECTS OF THE RAILWAY AND OTHER
COMPANIES APPLYING TO PARLIAMENT FOR
POWERS TO CONSTRUCT WORKS

WITHIN THE

CITY OF LONDON.

TO THE HONOURABLE THE COMMITTEE UPON IM-
PROVEMENTS OF THE COMMISSIONERS OF
SEWERS OF THE CITY OF LONDON.

SEWERS' OFFICE, GUILDHALL,
February 1st, 1864.

GENTLEMEN,

I beg to state that the various Notices which were served upon your Clerk, and which were referred to me by you last December, I find, upon examination, relate to twenty-three projects, the whole of which need Parliamentary sanction before they can be carried into effect, and the promoters of which have deposited Plans or Bills in furtherance of that object.

I have, in pursuance of your reference, examined the whole of the Plans deposited, and have also perused generally the whole of the Bills, and beg now to report to you upon the same.

The List of projects is as follows:—

1. Blackfriars Embankment, Roadway and Railway.
2. Charing Cross Railway—(additional Lands for Stations, &c.)
3. East London Railway—(Thames Tunnel Line).
4. Great Eastern Railway—(Metropolitan Station and Railway).
5. London and Blackwall Railway Extensions, &c.
6. London, Chatham, and Dover Railway, Bills Nos. 1 and 2—(New Lines, &c.)
7. London Low Level Railway.
8. London Main Trunk Underground Railway and connecting Branches.
9. London Union Railways.
10. Metropolitan Grand Union Railway.
11. Metropolitan District Railways.
12. Metropolitan Railway—(Extension to Trinity Square, Tower Hill.)
13. North and South London (High Level) Junction Railway.
14. North London Railway—(additional powers).
15. Oxford Street and City Railway.

16. Thames Viaduct Railway.
17. Tottenham and Farringdon Street Railway.
18. Thames Tunnel Railway.
19. Victoria Station and Thames Embankment Railway.
20. Courts of Justice Concentration — (acquisition of Site).
21. Holborn Valley Improvement.
22. Pneumatic Despatch Company.
23. Tower Subway.

A small Plan showing generally the lines of these projects will be found at the end of the Report.

Thus, of the total number,

19 are for Railway projects, or matters connected with Railways.

1 is for the acquisition of property to form a Site for a Public Building.

1 is for the formation of a High Level Roadway, and new Streets in connection with it.

1 for laying Pipes for the transmission of Parcels and Letters by Pneumatic Agency.

1 for the formation of a Subway or Tunnel beneath the Thames.

Total.. 23

BLACKFRIARS EMBANKMENT RAILWAY.

By this undertaking it is proposed to substitute an embankment and roadway in lieu of the viaduct which forms a portion of the authorised design for the embankment and roadway on the north side of the Thames, and which is to commence at a point nearly opposite the eastern end of the Temple Gardens, to continue in front of the City Gas Works, and terminate at Blackfriars Bridge.

It is proposed, also, to make a line of railway to commence at a point nearly opposite Middle Temple Lane, and terminate at Addle Hill, within a few yards of Doctors' Commons. It will pass beneath the new roadway which is to be made by this Company, and which will be at a higher level than the Thames Embankment as far as to Blackfriars Bridge.

From Blackfriars Bridge it passes across Chatham Place, Earl Street, Printer Street, Little Earl Street, Bristow Street, and the south end of St. Andrew's Hill, keeping nearly to the same line as the authorised new street to the Mansion House, and it stops at Addle Hill, about forty yards from its southern end. This railway is to be wholly in tunnel, or covered way.

A quay-way is to be made to serve as a passage-way for coals from the river to the City Gas Works. It is to go under the new roadway and over the embankment. Ground which will be reclaimed from the foreshore is to be given up either to the Gas Company, or the freeholder of the property fronting the Thames at that point.

The area of property in the City scheduled, including the portions of public way interfered with, is about *two acres*.

CHARING CROSS RAILWAY—(ADDITIONAL LANDS FOR STATIONS, &c.)

The Company apparently seeks to take seven properties on the west side of Dowgate Hill, and four in Scott's Yard, Bush Lane. The total area scheduled, including the area of the public way in Scott's Yard, is about a *quarter of an acre*.

It appears to be the intention of the Company to erect a large hotel in Cannon Street, at their terminus.

EAST LONDON RAILWAY—(THAMES TUNNEL LINE.)

This Company seeks power to enable them to construct various railways, and to connect, by means of the Thames Tunnel, certain railways on the south of the River Thames with others on the Middlesex side of the river.

The projected Railways are thirteen in number.

Railway No. 1 starts from New Cross Station of the London Brighton and South Coast Railway, and runs northwards in almost a straight line to the Thames Tunnel (280 yards of its length only being below the surface) it passes through the Thames Tunnel, in a direct line to New Road, St. George's in the East, thence passes, in open cutting, under the Blackwall Railway, curves eastwards to the Whitechapel Road, and continues in a northerly direction to the north-west angle of the Jews' Cemetery, it then turns, with a short curve eastward, and joins the Great Eastern opposite to the point of junction of the projected Line of the Great Eastern Company to Tottenham.

Railway No. 2 is a Branch springing from No. 1, at the north-west corner of the Jews' Cemetery, which, curving westward, joins the Great Eastern Railway near to Great Manchester Street.

Railway No. 3 is a short Branch from No. 1, at Deptford, which joins the Deptford Branch of the London, Brighton, and South Coast Railway.

Railway No. 4 is a short Branch springing from No. 1, near to St. Helena Gardens, Rotherhithe, crossing over No. 3 Railway, and joining the South Eastern Railway.

Railway No. 5 is a curved Line, forming a junction at one end with Railways Nos. 6 and 8, at Aldgate High Street, a little eastward of the City Boundary, and, at the other end, with Railway No. 1. This appears to be all in open cutting, and the level of Aldgate High Street will be unaltered.

Railway No. 6 is *entirely within the City*, and appears to be in open cutting, in covered way, or in tunnel, varying from eleven feet to twenty feet in depth; it commences by a junction with the authorised Metropolitan

Railway, at Little Moorfields, crosses Finsbury Pavement, and then runs midway between the houses in London Wall and the back of the houses of Finsbury Circus, crosses beneath Blomfield Street, Liverpool Street, at its junction with New Broad Street; and Bishopsgate Street, opposite to Devonshire Square; it terminates, with a slight curve and a junction with Railways Nos. 5 and 11, on the south side of Aldgate High Street, just outside the City Boundary. Cutler Street, White Street, Gravel Lane, Stoney Lane, Meeting House Yard, New Street, and Hutchinson's Avenue, are to be diverted, and Garden Place is to be stopped up.

Railway No. 7 is *entirely within the City*, and is a branch springing out of Railway No. 6, near Blomfield Street; it crosses beneath London Wall and Great Winchester Street, curves through the centre of Drapers' Gardens, and terminates near Telegraph Street and Little Bell Alley, east of Moorgate Street. It is to be altogether beneath the surface, (and Railway No. 9, hereafter described, is to be constructed over it upon a viaduct.) A Terminal Station is apparently contemplated with a frontage towards Moorgate Street.

Railway No. 8 *is entirely within the City*, and is partly on viaduct and partly in open cutting ; it starts from a junction with Railway No. 5, at Aldgate High Street, it proceeds, in open cutting and near to Railway No. 6, as far as to Meeting House Yard, Gravel Lane, from thence it gradually rises on to a viaduct, passes over Devonshire Square and Bishopsgate Street, and then, curving round in a northerly direction, joins on to the City Branch of the North London Railway, near to Sun Street.

Railway No. 9 *is entirely within the City*; it commences at Great Bell Alley, and terminates at its junction with Railway No. 8, in Bishopsgate Street.

It is shown to occupy precisely the same site as Railway No. 7, and that portion of Railway No. 6 which is between its junction with No. 7 and Bishopsgate Street ; but, instead of being below the surface, it is to be on a viaduct, the rails being from 16 to 20 feet above the surface of the public ways, crossing therefore, by bridges, over Bishopsgate Street, Liverpool Street, London Wall, Great Winchester Street, and several minor thoroughfares.

Railway No. 10 *is entirely within the City*, and is a short length on a viaduct, extending only from Blomfield Street to Liverpool Street, connecting Railway No. 9 with the North London, and it would practically form an extension of the North London Railway to Moorgate Street.

Railway No. 11 *is out of the City*; it is an open cut line from Aldgate High Street to Charlotte Street, Whitechapel, connecting Railways Nos. 6 and 8 with No. 1.

Railway No. 12.—This line *is partly within the City*; it joins Railway No. 8 at Devonshire Square, and branches from it near Hutchinson Street, crosses High Street, Aldgate, with a bridge, and continuing on to Great Prescott Street, it, at that spot, joins the London and Blackwall Railway. It is to be on a viaduct. At Devonshire Square the arches of the viaduct will be 7 feet high.

Railway No. 13 *is entirely within the City*; it is a short branch, striking out of Railway No. 12 at Aldgate High Street, and running into the Goods Station at Haydon Square. It is to be on a viaduct, crossing only one or two minor places.

It is to be noted that the Railway No 6 is to be below the surface, and that Railway No. 9 takes exactly the same route throughout its length, but is to be upon a viaduct, one railway will therefore be above the other

Railway No. 7 is also to be beneath the surface, and No. 9 to go over the same route upon a viaduct.

By these means it is proposed to make connection within the City with the Metropolitan, which is a subterranean line, and the North London which is a line upon a viaduct.

The area of property scheduled is, including the public ways, about *sixteen acres*.

Thus the railways of the group which enter and directly interfere with the City are *seven* in number.

No. 6. From Little Moorfields to Aldgate High Street (subterranean).

No. 7. From Blomfield Street to Little Bell Alley, Moorgate Street (subterranean).

No. 8. From Aldgate High Street, to Sun Street (partly in cutting, mostly upon viaduct).

No. 9. From Great Bell Alley, Moorgate Street, to Bishopsgate Street (upon viaduct).

No. 10. From Blomfield Street to Liverpool Street (viaduct).

No. 12. From Devonshire Square to the City boundary near Little Somerset Street (upon viaduct).

No. 13. From Aldgate High Street to the City boundary near Little Somerset Street (upon viaduct).

The scheme, generally, has for its object to complete the circle of railways round London—the northern, western, and southern parts of which circle are either actually formed or are in the course of formation. It is laid out so as to utilise the Thames Tunnel (which is to be purchased of the Thames Tunnel Company), and avoid the construction of a high level bridge over the river.

By connecting the lines north and south of the Thames, it will also put the London, Commercial, and Grand Surrey Docks, in connection with the Metropolitan Railway system.

The Company proposes to run two trains daily between their nearest station to and on the Middlesex end, and the nearest station to and on the Surrey end of the Thames Tunnel, at such hours as may be most convenient to the labouring classes, at fares not exceeding one penny per passenger for each journey.

GREAT EASTERN RAILWAY—(METROPOLITAN
STATION AND RAILWAYS.)

The Company seeks by this Bill to be authorised to make several railways in and near the Metropolis in connection with their existing railway, and to purchase lands for a station in the City of London.

The railways proposed are eleven in number, mostly situated in the north-north-east of London, some forming junctions with other railways, and mostly being for suburban traffic. The portion directly affecting the City is that designated as Railway No. 1, which is a railway from Wormwood Street, Bishopsgate, to Commercial Street, near the Shoreditch Terminus of the Great Eastern Railway.

It commences at a point about forty yards east of New Broad Street, and running parallel therewith, proceeds in a straight line to Sun Street, crossing Liverpool Street and Half Moon Street; it then curves round in a north-easterly direction to Primrose Street, crossing Sun Street and Skinner Street on the west side of All Saints New Church; it is then continued in almost a straight line, crossing Norton Folgate to its junction with the main line.

The line from Wormwood Street to Shoreditch will be on a viaduct, and the level of the rails will be nearly the same as that of the North London Railway. At Wormwood Street the rails will be about 16 feet 6 inches above the present street level; at Liverpool Street and Sun Street, about 18 feet 6 inches; at Skinner Street, 19 feet. All those streets, as well as the important thoroughfare of Norton Folgate, will be crossed by bridges.

The whole of the north side of Wormwood Street will be taken down, and also a large mass of property upon the line which lies between the North London Railway and the backs of the property in Bishopsgate Street. The total area scheduled, including public ways, is *ten and three-quarter acres*.

The main object of this scheme is clearly to bring passengers into the heart of the City. It appears that the Company has no intention of making a direct junction in the City with the Metropolitan and London, Chatham, and Dover lines; and that the Company also adheres to the plan of bringing in the railway on a viaduct, and crossing the main streets of the City by bridges. Practically, therefore, it would be the transfer of the Shoreditch Terminus to the City, bringing with it the train of consequences following such transfer.

LONDON AND BLACKWALL RAILWAY EXTENSIONS, &c.

This Company applies for an act to construct four new lines of railway in Stepney, Poplar, and Limehouse, and to enable them to provide additional accommodation at their present Fenchurch Street Station. For the latter purpose they have scheduled property commencing at Cooper's Row and terminating at Mark Lane, and propose constructing additional lines of rails between those points.

Savage Gardens is to be crossed by a bridge, having a clear height of twenty feet; Crutched Friars by one twenty-two feet high; New London Street by a bridge thirteen feet high.

The present archway over Crutched Friars now covers about 70 feet in length of the street, if this enlargement takes place it will amount to about 150 feet in the length of the street.

The Mark Lane branch of New London Street is to be stopped up and appropriated. About a dozen houses upon the east side of Mark Lane are to be destroyed. A considerable amount of pro-

perty upon the north side of Crutched Friars is also to be taken. The total area scheduled, including public ways, is *one and a-quarter acres*.

LONDON, CHATHAM, AND DOVER RAILWAY—
(BILLS Nos. 1 & 2.)

*New Lines, &c., Junctions with Metropolitan Railway
Additional Lands, &c.*

By these Bills the London, Chatham, and Dover Railway Company seeks power to enable them to make two short lines of railway to connect the City section of their metropolitan extensions, as authorised, with the Metropolitan Railway, and to form into a separate undertaking part of the City lines of the Company.

The Company is already authorised to make junctions with the Metropolitan Railway, and now seeks to substitute other lines (having the same object) which appear to them to be more desirable. In neither case is the deviation from the authorised lines considerable.

The main junction with the Metropolitan is to run from Snow Hill to Charles Street, more to the east of the authorised line.

The other junction is by a branch which is to leave the main line near to Snow Hill, and join the Metropolitan north-west of the New Smithfield Market.

Both lines are to be beneath the surface and covered in.

The Company also seeks power to purchase property in King Street and Snow Hill, beyond their present limit of deviation at that part of their line.

The formation of these branches will involve the destruction of much property in King Street and Smithfield, and present a favourable opportunity of widening that street in the manner proposed by the Holborn Valley Improvement.

By one of the notices served, it appears that the Company also proposes to confirm and give effect to the heads of arrangements made last year between it and the Commission with regard to the widening of streets and the substitution of ways for those stopped up or appropriated.

Also power to purchase additional property to that scheduled for their authorised line in 1859, at Printing House Lane, Playhouse Yard, Water Lane,

and eastern side of Seacoal Lane, and for property in Little Bridge Street.

The area of property and public way scheduled is about *four and three-quarter acres*.

LONDON LOW LEVEL RAILWAY.

This is a Bill for making a Railway from the Victoria Station of the London, Chatham, and Dover Railway Company to Charing Cross, and to the Farringdon Street and Finsbury Circus Stations of the Metropolitan Railway Company, and for other purposes.

The railways proposed by the Company are six in number, of which those numbered 1, 4, 5 and 6 are wholly or partially within the City, and are entirely subterranean lines.

Railway No. 1 is chiefly an underground line, commencing at the south-western end of the London, Chatham, and Dover Station, in the Victoria Road, Pimlico, passing to the south-west of New Bridewell to Victoria Street, thence along and beneath that thoroughfare, across Broad Sanctuary, St. Margaret Street, and enters the pro-

posed Thames Embankment at Westminster Bridge. It continues along the embankment to the south-east corner of the Temple, at which point it leaves it, and, with a slight curve northwards, passes round the north-western corner of the City Gas Works, thence between Tudor Street and Bridewell Hospital across New Bridge Street, and Water Lane; it then passes along the southern side of Doctors' Commons, crossing Bennet's Hill, Peter's Hill, Lambeth Hill, Old Fish Street Hill, Fye Foot Lane, Bread Street Hill, Huggin Lane, Trinity Lane, Garlick Hill, Queen Street, College Hill, to Dowgate Hill. This terminates Railway No. 1.

Railways Nos. 2 and 3 are branches leading out of No. 1, near to Charing Cross. Nos. 4 and 5 Railways will be described presently.

No. 6 Railway starts at Dowgate Hill, by a junction with No. 1, it crosses Turnwheel, Great Bush, Suffolk, Laurence Pountney, Martin's, and Crooked Lanes, and King William Street, south of the Statue, it then crosses Fish Street Hill at the south-west corner of Eastcheap, and describing a curve, crosses Philpot and Rood Lanes, and enters Fenchurch Street nearly opposite to Cullum Street, leaving it at a point opposite Ironmongers' Hall, then curving eastward it crosses

Mark Lane and Crutched Friars north of the Blackwall Railway, it then crosses America Square and the Minories, leaves the City and takes a circuit outside, crossing Great Alie Street, Whitechapel High Street, Wentworth Street, and Commercial Street; it again enters the City at Widegate Street, it then crosses Bishopsgate Street, Broad Street, Liverpool Street and Blomfield Street, and thence proceeds in nearly a straight line through the centre of Finsbury Circus, and joins the Metropolitan Railway at a point about 140 yards west of Finsbury Pavement.

Railway No. 4 begins by a junction with No. 1 at the north-west corner of the City Gas Works, it proceeds under Dorset Street and Bride Lane, to the South end of Farringdon Street.

Railway No. 5 also begins by a junction with No. 1, near Printing House Square, curves under Water Lane, Union Street, and Crescent Place, to a junction with No. 4 at the south end of Farringdon Street.

From the junction of Nos. 4 and 5, at the south end of Farringdon Street, No. 4 Railway runs along the centre of Farringdon Street and Road, past West Street, to a junction with the Metropolitan Railway near Peter Street.

As before remarked, the whole of the lines, with the exception of a very trifling length near the Victoria Station, are to be below the surface of the ground, and nearly the whole, apparently, are to be covered, the levels of no streets in the City being altered. The exception is the portion between the Minories and Finsbury Circus, which is to be open cutting, but well beneath the surface, the levels of the public ways being unaltered.

The total area scheduled in the City, within the limits of deviation, is about *twenty-five and a-half acres*.

In connection with these railways the Company seeks power to form the following new streets, should they think proper to do so.

A. A street from Charing Cross to the Thames Embankment, upon the line of Railway No. 2.

B. A street from Whitehall Place, connecting with street **A**, and thus with the Thames Embankment, upon the line of Railway No. 3.

C. A street leading from the Thames Embankment, beginning at the eastern angle of

the Temple, curving to the head of Whitefriars Dock, thence by the way of Tudor Street (which is to be widened), across Tudor Street, New Bridge Street, beneath the London, Chatham, and Dover Railway, and terminating near St. Andrew's Hill, by a junction with the new street, which is to be made to the Mansion House.

- D.** A street commencing in Eastcheap, about 30 yards east of Fish Street Hill, crossing Philpot Lane and Rood Lane to Fenchurch Street near to Mincing Lane.

These streets are to be formed upon the lines of railway—the railway to be beneath and the street above, after the manner of the Metropolitan Railway, beneath the Euston Road.

It appears to be contemplated that the Corporation will contribute towards the new streets in the City, and the Metropolitan Board to those streets which are out of the City.

It will be seen that these railways are almost exclusively in the City of London. They would connect the London, Chatham, and Dover and the Metropolitan, but have no direct connection with the Charing Cross Railway, the London and Black-

wall, the North London, or Great Eastern ; but the line is to pass beneath the first three named, and probably stations are to be built there—so that ready communication could be had with them.

Powers are to be given to the Metropolitan Board of Works to compel the Company, under certain conditions, to build lodging-houses for the poor.

The scheme would involve the reconstruction of the Fleet Sewer from its mouth to the Metropolitan Railway Station in Farringdon Road. This the promoters are prepared for. They also propose to stop up one-half only of the width of Farringdon Street and Road at a time, and to make a temporary roadway from Ludgate Hill to Fleet Street.

LONDON MAIN TRUNK UNDERGROUND RAILWAY AND CONNECTING BRANCHES.

Is to form a Company with power to make eight different railways in and adjacent to the City of London, so as to form a Circuit Railway connecting the various Railways now terminating in the Metropolis north of the Thames, and specially to facilitate communication with the Docks on the north side of the river. The railways are almost entirely to be beneath the surface.

Railway No. 1 commences by a junction with the Great Eastern, at Old Ford, and stops at the Toll Gate in the Mile End Road.

Railway No. 2 commences where No. 1 terminates; it runs along the Whitechapel Road, and enters the City at its boundary on that thoroughfare, thence curving northwards through private property, it goes beneath property on the north-east side of Houndsditch, and, crossing Bishopsgate Street, passes under the houses on the southern side of Liverpool Street, thence straight across New Broad Street, Blomfield Street, Finsbury Circus, and West Street, to a junction with the Metropolitan. It is to be entirely beneath the ground and covered in.

Railway No. 3 appears, from the deposited plans, to be precisely the same as that part of No. 2 which lies between the Metropolitan Railway and Castle Street, Houndsditch; from the latter point it curves into the eastern end of Fenchurch Street, crossing on its way thither, Duke Street, Mitre Street, and Aldgate, close to the pump; thence it continues along Fenchurch Street as far as Cullum Street, taking the centre of the road, it then curves in a south-westerly direction to the west end of Eastcheap, crossing on its way Rood Lane, and Philpot Lane, thence it passes along King William Street,

north of the Statue, and Cannon Street as far as to Bow Lane, thence it takes to the line of the projected New Street as far as to Rutland Place, from which point it curves sharply round in a south-westerly direction to a junction with the London, Chatham, and Dover Railway, crossing Earl Street, and by the end of St. Andrew's Hill, Purfleet Wharf, and Hood's Wharf, on its way thereto.

The whole of Railway No. 3 is subterranean, until it approaches Helmet Court, Upper Thames Street; the rails at that spot will be about three feet above the surface of the public way, from there it continues to rise to its junction with the London, Chatham, and Dover Railway. Peter's Hill is to be raised and diverted. Harrow Court is to be stopped up. Bennet's Hill is to be stopped and diverted. Helmet Court, Addle Hill, and Rutland Place are to be stopped up. St. Andrew's Hill is to be diverted. Earl Street is to be crossed by a skew arch 16 feet high and 90 feet span.

Railway No. 4 branches out from No. 3 a few yards east of Lambeth Hill, where it is in cutting or tunnel, it passes beneath that hill, and also Peter's Hill and Bennet's Hill, Addle Hill at its junction with Great Knight Rider Street, St.

Andrew's Hill, Ireland Yard, New Street, Friar Street, Church Entry, Water Lane, Ship Yard, and Little Bridge Street by an arch 15 feet high and 25 feet span, at which point it joins the London, Chatham, and Dover Railway, south of Ludgate Hill. It commences, therefore, as a subterranean line, gradually rises, and terminates on a viaduct. Addle Hill will be partly diverted. Ireland Yard, New Street, Church Entry, and Ship Yard are to be stopped up. Bennet's Hill, St. Andrew's Hill, Friar Street, and Water Lane are to be stopped up and diverted.

Railway No. 5 joins No. 3 near the western end of Eastcheap, by Pudding Lane, it goes along Eastcheap, and Little Tower Street, partly beneath the street and partly beneath property, crosses the road at the junction of Little and Great Tower Street, thence it skirts that thoroughfare to Mark Lane, —requiring to be taken down the whole of the houses on the north side of Great Tower Street— and it then curves slightly eastwards, and passing under Mark Lane, Seething Lane, the back of the houses in Barking Alley, across Trinity Square to the Minories; up to this point is to be below the surface of the public ways, the levels of which are to be unaltered; east of the Minories it gradually rises, and passing at the back of the houses on the south side of Royal Mint Street, it joins the London

and Blackwall Railway near its London Dock Branch.

Railway No. 6 commences at the Eastern end of Fenchurch Street, by Aldgate Pump, by a junction with No. 3, and terminates by a junction with No. 2, in High Street Aldgate, about 13 yards west of Half Moon Passage; the line will be entirely beneath the public ways named, the levels of which will be unaltered.

Railway No. 7 commences by a junction with No. 3, at Cannon Street, where it is subterranean; it commences to rise at once, and crosses Bush Lane, and Scott's Yard, and joins the Charing Cross Railway at Upper Thames Street; Bush Lane is to be diverted into Laurence Pountney Hill by a new street, running nearly parallel with Cannon Street, and about thirty yards south of that thoroughfare.

Railway No. 8 commences by a junction with No. 3, at Lambeth Hill, it then proceeds obliquely across and beneath Bristow Street (which will be stopped up), Little Earl Street, Printer Street, under the London, Chatham, and Dover Railway, under Earl Street, Bridge Street, and to the proposed Thames Embankment, along which it continues to its termination at Westminster Bridge. The whole is to be beneath the surface.

The total area scheduled in the City, including public way, is about *thirty and a-quarter acres*.

The Company professes to have laid out the scheme with special reference to the wants of the City, and also to have specially held in view the requirements as set forth in the third Report of the Lords' Committee upon Metropolitan Railway communications, which sat last session of Parliament. In a marked degree it incorporates the principle of forming new streets and widening others within the City; indeed it apparently aims at forming the whole of its lines, either beneath existing streets which now require to be widened, or upon lines upon which it deems it desirable that new streets should be formed; and it seeks permissive powers for the Corporation and the Commissioners of Sewers, and the Metropolitan Board of Works respectively, to co-operate with the Company for these purposes, and to contribute towards the cost of the streets.

Thus it proposes to widen the whole length of Liverpool Street on its southern side—to widen Houndsditch from Bishopsgate Street to Castle Street—from which point two short new streets are to be formed, one curving south-east and joining Aldgate High Street, at the City boundary, the other curving southwards, and entering Aldgate, near to the pump.

It also proposes a new street from the western end of Eastcheap to Fenchurch Street, opposite to Cullum Street, somewhat in the direction of the street which has been under the consideration of the Corporation, and to widen Little or Great Tower Street to Mincing Lane, and thence to form a new street upon the line aforesaid, above the Railway, across Trinity Square to the Minories.

A new street is also suggested on each side of the viaduct from Crescent Place, New Bridge Street, to St. Andrew's Hill.

The Company also proposes to make subways in connection with the railways, for gas, water, and other purposes.

It proposes likewise to be bound to run one train each way daily between Bow and the westernmost station of the City, for the convenience of the labouring classes, the fare for each passenger not to exceed 2d. for each journey.

LONDON UNION RAILWAYS.

This is a Bill to authorise the construction of a railway, or railways, from the Midland Railway, in the parish of Hendon, to the London, Brighton,

and South Coast and South Eastern Railways, near the Bricklayers' Arms Station, with branches connecting the other railways in and near London, and branches in the cities of London and Westminster.

The railways to be made are *ten* in number. They are mostly suburban, and principally to the south and south-west of the Metropolis. It also seeks extensive running powers over other lines, and power to use many stations of other companies. The portion of the scheme directly affecting the City are the railways numbered 9 and 10.

No. 9 Railway passes from Westminster Bridge along the Thames Embankment; at the foot of Blackfriars Bridge it curves northwards into the City, goes under Earl Street, Shoemaker Row, Pilgrim Street, Ludgate Street, the Old Bailey, Fleet Lane, and Skinner Street, to a junction, north of Snow Hill, with the Metropolitan Extension of the London, Chatham, and Dover Railway.

The whole length of the line, from Blackfriars Bridge to its termination, is in open cutting, tunnel, or covered way.

Railway No. 10 commences by a junction with Railway No. 9, near Hood's Wharf in Earl Street,

and is to be carried along the line of the New Street from Blackfriars Bridge to the Mansion House, terminating with a station in the Poultry and Charlotte Row. The whole line is to be subterranean.

The total area scheduled in the City, within the limits of deviation, is *seventeen acres*, which includes the streets and public places intended to be interfered with.

METROPOLITAN GRAND UNION RAILWAY.

“This is a Bill for making and maintaining Railways to connect the Main Railways within and near the Metropolis.”

There are seventeen railways projected in all, nearly the whole of which enter, or are within the City.

Railway No. 1 commences at Fulham, by a junction with the West London Railway, and then proceeds to Westminster Bridge, goes along the Embankment (either in deep cutting or tunnel,) and *enters the City* by a tunnel at Blackfriars Bridge; it then follows the line of the proposed new street to the Mansion House, as far as to Lambeth Hill; then

leaving the new street to the north, it proceeds in almost a straight line to Laurence Pountney Lane, crossing beneath Garlick Hill, Queen Street, Dowgate Hill, and all other streets and public ways between those points, it then passes round the northern curve of Arthur Street West, under King William Street, south of the Statue, and beneath Pudding, Botolph, and Love Lanes, just to the south of St. Dunstan's Church, and through the churchyard; it thence proceeds under Cross Lane, Harp and Water Lanes, crosses beneath Great Tower Street, Seething Lane, Catherine Court and Savage Gardens, round the north-west corner of the Trinity House, and goes under the Blackwall Railway; it then keeps south of John Street, and crosses America Square and the Minories. Up to this point it is entirely in tunnel, or covered way; but it then begins to rise, and passes south of, but close to Swan Street, over Prescott Street, and ascends to a junction with the rails of the Blackwall Railway, near Thomas Street, St. George's-in-the-East.

Railway No. 2 branches from Railway No. 1 at Cooper's Row, and curving in a northern direction, passes beneath New Square and the Minories, to the east side of that street, continues beneath, nearly in a straight line, to the City boundary, at the corner of Three Tun Alley, in Middlesex Street; then, leaving the City, with a curve it passes at the

back of the property on the eastern side of Middlesex Street, and *re-enters* the City at the end of Widegate Street, by Sandy's Row; it passes beneath Bishopsgate-street a few yards north of Artillery Lane, and runs north of Half Moon Street, across Wilson Street, South Place, and Finsbury Pavement, a few yards south of South Place, and joins the Metropolitan Railway at Milton Street. It is to be entirely in tunnel, or covered way.

Railway No. 3 *is out of the City*; it commences at Pelham Street, Kensington, and ends at Spring Street, Paddington, by joining the Paddington Extension Railway.

Railway No. 4 *is out of the City*; it commences at Gloucester Road, and terminates in the Bishop's Road, Paddington.

Railway No. 5 *is out of the City*; it is a short length, branching out of No. 1, and running into the Victoria Station at Pimlico, joins on to the London, Chatham, and Dover Railway.

Railway No. 6 commences by branching out of the South Eastern Railway, near Blue Anchor Lane, Bermondsey, and following that line to Tooley Street, thence by the way of Stoney Lane, and

crosses the River Thames to Tower Dock by a high level bridge of one arch, 820 feet span and 100 feet above high water line, Trinity datum. It then passes over Great Tower Hill and Trinity Square, over the Blackwall Railway, at Cooper's Row (its rails being 17 feet 6 inches over those of the Blackwall Railway), and gets on to but over the same line as that of Railway No. 2, along which it goes as far as to Artillery Lane, from thence it curves in a northerly direction, and passes *over* the authorised North London Railway at Cumberland Street, Shoreditch, the rails being at that spot 18 feet above the North London Railway, and continuing in the same direction, it descends to and finally joins the North London Railway, a few yards north of Bateman's Row, Shoreditch. It is throughout a very high level line.

Railway No. 7 *is entirely out of the City*; it branches out of No. 6, and is upon the south side of the Thames.

Railway No. 8 commences by a junction with No. 6 (high level line), close to the Blackwall Railway, by Cooper's Row, and proceeds in the same direction and immediately over Railway No. 1 (which is a low level line) as far as to Great Prescott Street, Whitechapel; it then diverges slightly to the north, and runs parallel with No. 1,

until it has descended to the same level and joins on to No. 1, close to the junction of that Railway with the London and Blackwall Railway.

Railway No. 9 *is entirely out of the City* ; it is a loop line, branching from No. 8, at Great Prescott Street, and joining it again within a few yards of the junction of that line with the London and Blackwall Railway.

Railway No. 10 is a high level Railway, it is a short line branching out of No. 6, at Three King's Court, Minories, and passing by a viaduct over Railway No. 1 and under Railway No. 8, joins the Haydon Square branch of the London and North Western Railway.

Railways Nos. 11 and 12 are loop lines branching out on opposite sides of No. 6 (high level Railway), at Three King's Court, Minories, and running nearly parallel with that line as far as Artillery Lane (No. 6 being for that distance immediately above No. 2), Railway No. 12 then passes under Railways Nos. 6 and 13 at that spot, and then converging towards No. 2, both 11 and 12 unite with it at a point about 100 yards west of Bishopsgate Street.

Railways Nos. 13 and 14 are loop lines, diverging

from No. 2, at Three King's Court, Minories, and running nearly parallel with No. 2, as far as Artillery Lane (No. 6 being immediately above No. 2 for that distance), they then converge towards No. 6, and unite with it at Newnham's Place, Bishopsgate ; Nos. 2, 11, and 12 cross under Bishopsgate Street Without, and Nos. 6, 13, and 14 cross over that street.

Thus, for some distance, there are six lines of Railway running almost parallel to each other, one of which (No. 2) is low level throughout, one (No. 6) is high level throughout, two (Nos. 11 and 12) commence high level and terminate low level, and two (Nos. 13 and 14) commence low level and terminate high level.

Railway No. 15 branches out of the western side of No. 6, at Newnham's Place, in the City, and, curving round towards the eastern end of Worship Street, terminates there. It is altogether on a viaduct.

Railway No. 16 *is out of the City* ; it is a loop line branching out of No. 6, at Worship Street, runs nearly parallel with that line as far as New Inn Yard, and it then converges towards and joins it again at a few yards beyond Bateman's Row, Shoreditch.

Railway No. 17 *is out of the City*; it is a short length, springing out of No. 1, in conjunction with No. 5, and running in the same direction with it, joins the Victoria Station and Pimlico Railway.

The total area of the property and public way scheduled for this scheme, in the City, is about *twenty-five and a half acres*.

METROPOLITAN DISTRICT RAILWAYS.

This is a Bill having for its object, as it is concisely stated, “to authorise the construction of a system of railways within and around the Metropolis.”

It is, however, from its magnitude and comprehensiveness, and from the fact of its apparently having been designed so as to be in strict accordance with the views expressed in the third Report of the Select Committee of the House of Lords upon Metropolitan Railway Communication (1863), a design requiring the most careful consideration. Its general nature, its object, and the works embraced by the design, will be best understood from the following description:—It comprises—

Firstly. A railway on the north side of the

Thames, to form a continuation of the Metropolitan Railway from its proposed extension at Brompton, to pass from Brompton by way of Westminster Bridge, along the north bank of the Thames, within the line of the embankment, to join another proposed extension of the Metropolitan Railway near Fenchurch Street, in the City (see Metropolitan Railway extension to Trinity Square, Tower Hill), thus completing a circle of railway in London which will communicate with, or be in close proximity to, all the railway stations in London, north of the Thames. This railway is to be called, *The Main Inner Circle Railway*.

Secondly. A railway commencing on the south side of the Thames, by a junction with the London, Chatham, and Dover Railway at Clapham, passing across the Thames, between Chelsea and Battersea bridges, connecting itself with the Main Inner Circle (just described) at Brompton, thence passing through Kensington, Kilburn, Kentish Town, Stoke Newington, Clapton, Hackney, and Bow, and, ultimately, from Bow, across the Thames at Rotherhithe, to join the South Eastern Railway near New Cross, and by that junction with other railways south of the Thames, forming a complete circle of railways around the Metropolis. This railway is to be called, *The Main Outer Circle Railway*.

Thirdly. *A series of branch railways* connecting the *Main Outer Circle Railway* with the following authorised and existing railways, namely:—The West London Extension, the West End of London and Crystal Palace, the West London, the Hammersmith and City Junction, the Great Western, the London and North Western, the Midland, the Hampstead and City Junction, the Great Northern, the Great Eastern, the North London, the Blackwall, the London, Brighton, and South Coast, and the South Eastern.

The connections with the South Western Railway and with the London, Chatham, and Dover Railway being effected either by direct junctions with the Main Outer Circle Railway, or by means of the subsidiary railways, to which branches are made.

The railways comprehended under the three foregoing classes will be thirty-four in number; of which, although the whole must more or less have influence upon the City traffic, the Railways 33 and 34 are alone to be made within the City.

Railway No. 33 starts at Bridge Street, Westminster, proceeds along the Thames Embankment to Blackfriars Bridge; at that point it enters the City, crosses under Chatham Place, strikes into the pro-

posed new street to the Mansion House, along which it continues as far as the western end of Great Trinity Lane; it is then to be constructed beneath the property on the southern side of Great Trinity Lane, Great St. Thomas Apostle, and Cloak Lane, until it stops immediately beneath the line of the Charing Cross Railway, at its terminus in Cannon Street.

Railway No. 34 commences at a junction with No. 33, in Cannon Street, where No. 33 terminates, and is carried about 100 feet south of Cannon Street, passing under the various lanes leading out of that thoroughfare, then passes under King William Street, south of the Statue, and under Fish Street Hill and the various lanes which lie south of Eastcheap, keeping close to, but to the north of the churches of St. Mary-at-Hill and St. Dunstan's-in-the-East; it then strikes towards Great Tower Street, beneath which it passes, at its point of junction with Mark Lane, and then, gently curving to the north-east, and passing north of the church of Allhallows Barking, and beneath Trinity Square, to a point on the southern side of the London and Blackwall Railway, by the Crescent, Minories, it terminates, but is apparently intended to form a junction with the Metropolitan Railway (extension to Tower Hill), which will be hereafter described, and which will thus continue the line on beneath

the Minories, Bishopsgate Street, and Finsbury Circus, to a junction with the authorised Metropolitan Extension at Little Moorfields. The whole line is to be subterranean.

A large station is apparently to be formed between John Street, the Minories, and Cooper's Row ; others are to be formed at Liverpool Street, Cannon Street, and Earl Street, within the City, and by the communication of the Outer Circle Railway with the trunk-lines of England, by the stations placed upon those railways near to every important suburban road, and by the junctions of the outer with the inner circle of railways, it is expected that the scheme, by itself, will relieve almost every Metropolitan want in respect of traffic.

The total area scheduled in the City, including the public ways, is nearly *nineteen acres*.

METROPOLITAN RAILWAY—(EXTENSION TO TRINITY SQUARE, TOWER HILL).

This is exactly what the title implies, it commences by a junction with the Metropolitan Railway at Little Moorfields, goes straight through Finsbury Circus, under the property on the south side of Liverpool Street, thence through property on the north side of Houndsditch and the Minories,

crosses beneath the latter street near Swan Street, and terminates beneath the Blackwall Railway, near the Crescent, Minories, at which point it is apparently intended to join on to Railway No. 34 of the Metropolitan District Railways, just described; it is to be a tunnel or covered way its whole length.

The total area scheduled in the City, including the public ways, is *seven and a-quarter acres*.

NORTH AND SOUTH LONDON (HIGH LEVEL) JUNCTION RAILWAY.

Under this title, application is made to Parliament for powers to construct three railways, or some part thereof.

No. 1 is a railway commencing upon a *viaduct* 23 feet 4 inches above the surface of the pavement, and at about 25 yards east of Moorgate Street, near Great Swan Alley, where there will be a terminus; it then is to be carried across Drapers' Gardens, through property between Great Winchester Street and Austin Friars, over Old Broad Street, Bishopsgate Street, St. Helen's Place (which it almost entirely destroys), St. Mary Axe, Leadenhall-street,

not far from Cree Church Lane, and Fenchurch Street, over the Blackwall Railway,—the level of the rails at that spot being proposed to be 25 feet 6 inches above those of the Blackwall Railway,—and thence across Great Tower Hill, to Tower Dock; at that point it is to cross over the Thames by a bridge of one arch, of 820 feet span, with 100 feet clear central headway, above high-water mark; proceeding southwards, it crosses the London and Brighton Railway at a height of 56 feet 9 inches above it (not far from Tooley Street), and finally, descending, joins the London and South-Eastern Railway, near Bombay Street, Bermondsey.

Railway No. 2 commences in Norton Folgate, by a junction with the North London Railway, about midway between Worship Street and Primrose Street; it crosses Sun Street, Liverpool Street, and Bishopsgate Street, and then joins Railway No. 1, near to St. Mary Axe. It is, likewise, upon a viaduct.

The area of property and public way scheduled within the City is full *sixteen acres*.

NORTH LONDON RAILWAY—(ADDITIONAL POWERS).

This Company applies for additional powers to enable them to take property and execute work at different portions of their line. The property they desire to take within the City is to the extent of about 100 feet on the east side of their station in Liverpool Street, the area of which is bounded on the north by Half Moon Street, and on the south by Liverpool Street. The public ways absorbed or interfered with are Broad Street Buildings, Thompson's Back Rents, Thompson's Court, and Thompson's Rents.

The total area of private property and public way scheduled is little more than *eight-ninths of an acre*.

OXFORD STREET AND CITY RAILWAY.

This line is entirely in tunnel. It commences at the western end of Oxford Street, at the junction of that street with the Edgware Road, and proceeding along Oxford Street, New Oxford Street, and High Holborn, it leaves High Holborn at about 30 yards west of Middle Row, by curving in

a north-easterly direction, and crossing Gray's Inn Lane and Brook Street, it passes along Greville Street and Charles Street, crosses Great Saffron Hill, and terminates at Victoria Street (now called Farringdon Road), opposite the Farringdon Station of the Metropolitan Railway.

The only property scheduled in the City is four or five houses at the western end of Holborn Buildings, and a small portion of the public way—together being a total area of about 2,780 *feet*.

There is a speciality about this project worthy of notice. The railway is to be worked by pneumatic agency. It is well known that parcels are now despatched for some distance through the tubes of the Pneumatic Dispatch Company with regularity and expedition, and the experience gained in that work, induces the engineer to believe it can most successfully be applied to a railway, for the conveyance of passengers. If this Bill passes, and the railway is subsequently built, it will, therefore, be worked without locomotive engines. But it should be remarked, that the mode of using atmospheric air as a power will be entirely different from that formerly employed upon portions of the Croydon and the South Devon Railways.

THAMES VIADUCT RAILWAY.

This project, as put forth, is undertaken solely with the view of establishing a rapid communication between the City and Westminster, and intervening points.

It is proposed to construct a viaduct down the centre of the River Thames, between London Bridge and Westminster Bridge; it is to be built mainly of iron, the supports are to be columns 8 feet diameter at a distance of 200 feet, and it is contended, that in such position they will not prejudicially interfere with the navigation of the river. The viaduct is to pass over the various bridges, leaving about 20 feet headways, and from each bridge communication is to be provided by the staircases leading from the footways; London Bridge is excepted, at that bridge special approaches are to be formed to the railway.

By the Bill the Company will bind itself to charge but 2d. for each journey by first class, and a 1d. for second class passengers, excepting by express trains.

It is thought that the whole distance will be run in five minutes by express trains, and ten minutes by ordinary trains. Trains are to run every five minutes.

Although notice was served upon the Commission by the Company, its works do not appear likely to interfere with anything within their jurisdiction.

TOTTENHAM AND FARRINGDON STREET RAILWAY.

This line commences by a junction with the Great Eastern Railway near Tottenham, and for a considerable extent follows the bed of the New River. It runs along River Terrace North, across the City Road, Goswell Road, beneath a large number of other streets, and beneath Clerkenwell Green. It enters the City at a point about thirty yards east of the present Metropolitan Station in Farringdon Road, and crosses beneath West Street, Snow Hill, Skinner Street, and joins on to the London, Chatham, and Dover Railway, north of Ludgate Hill.

It is assumed by the promoters of this line, that West Street and Skinner Street will be raised, and that Snow Hill will be stopped up, as proposed by the Corporation of the City of London, by their deposited Plan for the Holborn Valley Improvement, and that the railway will pass under those streets; but it appears to have escaped their notice, that a new street from Skinner Street to Farringdon Road, situated further north than the present

Snow Hill, is also proposed by the Corporation, and the surface level of the said street, at its point of contact with the proposed railway, will be only about 12 feet 3 inches above the proposed line of rails.

All the thoroughfares through or over which the line passes, between Skinner Street and Ludgate Hill, are to be stopped up.

The property scheduled comprises the whole of that upon the east side of Farringdon Street, and Farringdon Road for a considerable distance eastwards from those lines of frontage. The total area is about *nine and a-half acres*.

This line will put the Great Eastern into direct connection with the Metropolitan and the London, Chatham, and Dover Railways.

THAMES TUNNEL RAILWAY.

This is a Bill for connecting the Railways south of the Thames with the London and Blackwall Railway, the Thames Tunnel being appropriated for that purpose, and also to form a central Station in or near Monument Yard in the City.

The Railways proposed by the Company are seven in number.

Railways Nos. 1 and 2 are in the Hamlet of Ratcliffe, and include the lines through the Thames Tunnel.

Railways Nos. 3, 4, and 5 are in the parish of Rotherhithe, and connected with the London and Greenwich, and the Thames Junction Railways, No. 5 having a station in the Surrey Docks. No. 7 is in the parish of Shadwell, and No. 6 alone enters the City.

Railway No. 6 branches out from Railway No. 1, at a yard belonging to the London Dock Company, on the east side of Old Gravel Lane. It curves northwards under New Road, turns directly west, and runs at the back of property upon the north side of and along the whole line of Cable Street and Royal Mint Street, crosses beneath the last-named street, and beneath the Minories, the Circus, and Trinity Square, thence passing north of Allhallows Church, it curves southwards under Great Tower Street, by Mark Lane, and passes north of St. Dunstan's Church, and thence beneath, the various lanes which run between Eastcheap and Lower Thames Street, to Monument Yard, at which point

is to be formed a large terminus, to be called The City Central Station.

Within the City the line appears to be entirely in covered way or tunnel, the levels of all the public ways being unaltered.

The total area scheduled in the City, including public way, is about *five and a-half acres*.

A large extent of property is scheduled along the entire line. One large block, apparently intended for the terminus, occupies a space bounded by almost the entire length of Fish Street Hill, the north side of Lower Thames Street to Botolph Lane, by the west side of Botolph Lane, as far as to the churchyard, by a line which goes round outside the churchyard, thence goes straight on in a westerly direction to Fish Street Hill.

The Monument of London, in Fish Street, is among the property scheduled.

The Thames Tunnel Company is to be wound up, and the Tunnel transferred to this Company.

VICTORIA STATION AND THAMES EMBANKMENT RAILWAY.

This is a project for forming an underground line of communication between Pimlico and Blackfriars, commencing on the north side of the Victoria Station, in Lower Belgrave Place, and proceeding in an easterly direction towards the Palace Yard, and then curves into the Thames Embankment on the eastern side of Westminster Bridge; and from thence it proceeds to within and close to the river side of the Embankment to its termination at Bridewell Wharf, on the western side of Blackfriars Bridge. The height of the tunnel is only 10 feet 6 inches.

The line does not interfere with any property in the City, but with portions of the foreshore only.

COURTS OF JUSTICE CONCENTRATION—

(ACQUISITION OF SITE).

The title of this Bill bespeaks the nature of the work intended to be performed. The deposited plans show that a large quantity of property is to be removed; it is bounded on the north side by

Carey Street and Yeate's Court, east by Bell Yard, Fleet Street, south by Fleet Street and the Strand, from Bell Yard to Clement's Lane, and west by Clement's Inn.

The total area, including public ways, is about *seven and a-half acres*, of which four or five houses only are within the City. The area of property to be taken in the City is but about 350 *yards superficial*.

The Temple Bar is among the property scheduled.

HOLBORN VALLEY IMPROVEMENT.

This is a scheme, promoted by the Corporation of the City of London, to authorise it "to form a viaduct or raised way across the Holborn Valley, and new streets and improvements connected therewith, and for other purposes."

It is proposed to take down the property upon both sides of Skinner Street, and Holborn, between Hatton Garden and St. Sepulchre's Church, and form a high level roadway between those points; it is to be formed more upon the southern than upon the northern sides of the existing roadways.

Farringdon Street is to be crossed by a bridge,

having a minimum central headway of 21 feet. Flights of steps are to be formed at the angles of the bridge, to afford to pedestrians communication between the upper and lower levels.

Shoe Lane is to be crossed by a bridge, leaving a clear headway of 16 feet; the gradient of the new portion of the lane will be 1 in 30, and the street will be continued northwards, 30 feet in width, to a new street which is to be formed, and is hereinafter described.

Farringdon Road is to be widened as far as to West Street, to the present width of Farringdon Street.

Portions of Farringdon Street and Farringdon Road are to be altered in level, Farringdon Street is to begin to rise from Newcastle Street, with a gradient of 1 in 45, and continue at that slope to West Street, thence it is to fall northwards with a gradient of 1 in 100 as far as to Charles Street.

Two new streets are to be formed between the upper and lower levels; both are to start from Farringdon Road.

The western street is to start opposite to that street now in the course of formation by the Cor-

poration, and join the upper level at Hatton Garden; the gradient is to be 1 in 45. It is with this street that Shoe Lane is to be connected. It will not only connect the upper and lower levels, but will form a direct communication to the New Market, from Holborn.

The eastern street to start a little north of the bridge over Farringdon Street, and join the upper level by St. Sepulchre's Church, the gradient to be 1 in 45. This will practically be in substitution of Snow Hill, and will not only communicate with the viaduct, but, by an improved gradient, with King Street, Smithfield, and Long Lane.

Hatton Garden, Ely Place, and nearly all the courts and places abutting upon the high level roadway will have their gradients improved.

The foregoing is a general outline of the scheme; but it may be subject to such variations, both in levels and lines of streets, as, in the working out, will be advantageous. The area scheduled will admit of much variation. Clauses in the Bill are drawn with the same object.

Powers are also sought to widen King Street, from Snow Hill to Smithfield, and to complete the widening of the western end of Newgate Street.

Powers are sought to form subways of gas and water pipes, and to construct dwelling houses for the labouring classes.

The streets and ways when formed and completed, are to be placed under the charge of the Commissioners, to be maintained, cleansed and lighted by them like other public ways within the City.

PNEUMATIC DESPATCH COMPANY.

The Pneumatic Despatch Company has already power to open the streets of the Metropolis and the City, and to lay tubes beneath them: these powers expire during the present year. The present Bill is to extend those powers within the limits of the Metropolis for a period of ten years.

The Company also, for its purposes, seeks power to take various properties in the Metropolis, among which are three houses on the north-east angle of Newgate Street, and one house at the south-west end of St. Martin's-le-Grand; but if the owners choose to demand it, the Company is to acquire an easement only in the property, which may enable them to lay their tubes beneath it; power is also sought to lay their tubes through the open

ground attached to Christ's Hospital, in Newgate Street, which forms the quadrangles and play grounds of that building.

There is also a power sought to enter and use the vaults, belonging to private owners, beneath public ways, without purchasing the houses to which they are attached, but making compensation for damage occasioned by the exercise of that power or by occupation of the vaults.

The object of this Company is the transmission in bulk, through these tubes, of all letters from the general receiving houses in the Metropolis to the various lines of railways ; and it is anticipated, also, that a large portion of the goods which are now conveyed through London by carts and waggons, will be shot through the tubes between various stations, and that the traffic in the streets will be lessened by their agency.

Differences between the Commission, the Metropolitan Board of Works, and district boards, to be determined by an engineer to be appointed by the Board of Trade.

TOWER SUBWAY.

This was a project for forming a subway, or tunnel, beneath the Thames, from Horselydown Stairs to Irongate Stairs, Tower Hill. It was altogether beyond the City boundary. The Bill has been withdrawn.

I have now endeavoured to set before you a general view of the projects which communicate with the City of London, and a somewhat closer description of those portions of them which are to enter the City, and which, therefore, more directly affect it, and have, I believe, drawn your attention to most of their salient features.

I submit for your inspection a Map of the City, to a large scale, showing the lines of the various railways, and the area of the property scheduled; this Map is far from being as clear and intelligible as may be desired. It is, however, hardly possible to make it more distinct, as in so many

instances the lines of the various schemes cross and re-cross each other, or take the same route, or schedule the same property.

The total length of the various railways proposed to be made within the City's jurisdiction is about 20 miles.

The sum of the areas respectively scheduled for projects of all descriptions amounts to about 211 acres, but many parts are under notice by two, three, or four companies, and the actual area scheduled is probably about 160 acres only, which is about *one-fourth* of the entire City.

The various public ways, of all description, which are interfered with is about 300; but in comparatively few cases are the levels to be altered when the works are executed. The area proposed to be appropriated does not seem large.

As to the sewerage within the City, it may be said of a very large portion, that it will be annihilated, and will have to be reconstructed upon an entirely different plan; what the actual alteration may be, will be a subject of future and detailed consideration.

There probably never was a city threatened at

once by so many projects, as the City of London is at the present time ; nor were there ever presented to Parliament, in one session, so many schemes which affected the Metropolis; neither have schemes been presented of greater boldness of conception, or with greater indifference to cost. As already described, two companies propose buying up and utilising the Thames Tunnel; two propose crossing the River Thames, west of the Tower of London, by bridges, with spans of 820 feet, and with heights of 100 feet above high-water mark; another which is to cross at Limehouse is equally ambitious; whilst, to the west of London, four or five bridges, although of less imposing dimensions, are proposed to be built. The Monument, at Fish Street Hill, and Temple Bar, Draper's Gardens, Finsbury Circus, Apothecaries' Hall, and portions of the *Times* Office are also scheduled, as are various of the City halls and the Admiralty at Whitehall. There are several lines propose taking possession of portion of the Thames Embankment, and one to take possession of the centre of the river itself. Public parks and gardens are to be cut or tunnelled through. The line of the Fleet Sewer, throughout its length within the City, and a considerable portion without the City, is to be reconstructed, the sewerage of several square miles is to be interfered with, and property to the value of many millions of pounds sterling is put under notice.

Some of the schemes are for railways upon

viaducts ;—those which propose making junctions between the north and south sides of the Thames by bridges are necessarily so. The largest portion are, however, intended to be below the surface. Nearly the whole within the City are to be in tunnel or covered way.

The whole of the schemes carefully avoid touching churches, indeed, portions of most of those in the City are curved in various directions apparently for the sole purpose of avoiding them ; the churchyards are not treated with the same respect, as the lines are to be carried through many of them, and in several cases very near to the walls of the churches, although the churches are to be left untouched.

It must, at the same time, be said that there are projects among them which aim at comprehensiveness and completeness, some indeed are designed with the view of affording complete measures of railway accommodation for the Metropolis, and others in which the wants of the City have evidently been studied with great care ; most of the designs also bear evidence of being laid out so as to accord with the views expressed in the third Report of the Committee of the House of Lords upon Metropolitan Railway Communication.

It would have been an impossible task, in the time allotted, to form a sound opinion as to the merits of the respective schemes, some of which

closely resemble each other in direction and in fundamental principles, and it would, moreover, be premature to attempt to do so, for some have already disappeared from the struggle, others undoubtedly will follow them, and the question of merit can be raised (if raised at all this session) between the few which ultimately will remain in competition.

Outlines of my views upon the wants of the City and the Metropolis, in respect of Railway accommodation, were given in my report to the Commission last year, and also in my evidence before the Select Committee of the House of Lords; after much subsequent consideration, and after the examination of the various schemes now reported upon, I see no reason materially to alter those views.

Whatever may be the causes which have led to it, and whatever regret there may be felt about the fact, there can be no doubt of the necessity for increased railway accommodation in the Metropolis, and no part of it is so much interested in that want being properly relieved, as the City of London.

It may indeed be said, that the most pressing want of the Metropolis is cheap and ready means of access, in all directions, to and from the City: a want perfectly understood by the promoters of the schemes affecting the Metropolitan districts,

almost the whole of whom seem to aim, either by direct lines or by junctions with other lines, to effect an entry within its area.

An extension of railway accommodation seems therefore, from the admitted necessities, and from the recent tendency of railway legislation, inevitable; but it is of the first consequence that interests so great as those of the City should not be even temporarily inconvenienced, excepting by projects which have received the utmost care and attention in their design: whether fragmental schemes, carried out to suit the immediate necessities of particular districts, or springing from the competition of rival lines, will best afford this, is a wide question. It is true, that in some shape and fashion, the Metropolis may get its difficulties of transit relieved by such agency; but if what has been done may be taken as a criterion of what may be expected, it will certainly leave much to be regretted—as there is already so much to regret, of needless, but permanent inconvenience, and almost irremediable ugliness in the main thoroughfares.

Whether the Legislature will, under the present pressure, take measures itself to lay down a broad, comprehensive plan to meet the requirements of London, remains to be seen,—but no time should be lost by the Commission, either in investigating more closely the various projects which may pass

Standing Orders, or in presenting its views to the Legislature as to the necessities of the area within its jurisdiction.

I have a few words to add before I conclude. The information I have placed before you has been obtained almost entirely by investigation of the deposited Plans, and a perusal of the Bills. It will be readily understood that such an examination could alone be properly made by having the various documents conveniently at hand, so that the assistance requisite in looking through them could be usefully employed. For the partial facility which I have obtained in this particular, I am indebted to the courtesy of the Engineers and Parliamentary Agents to the various projects; who have, in most cases, afforded me the use of their plans, and given me the information I wanted. Some of the Bills and the information, however, only reached me when the Report was nearly completed; and the delay and difficulty which necessarily has occurred in obtaining the documents, and the large number of projects to be examined into, has made it a work of much labour; and this, I trust, will excuse any omissions, and I should perhaps add errors, which may be discovered.

It should be known that with respect to rail-

ways, and all other projects affecting the City, the Commission has but the same means that every member of the community possesses for obtaining information, namely, by applying to the Clerk of the Peace, at the Sessions House, and upon payment of the requisite fees, acquiring the right to inspect or copy the documents lodged there. Now, for the mere casual inspection, there is but slight accommodation at that office; and, as to tracing or copying plans, it amounts almost to an impossibility, when much has to be accomplished in a short time.

I draw attention to this fact, because every district Board in the Metropolis is entitled to have, and has deposited with it, copies of all Plans or portions of the Plans for railways and other works likely to interfere with the property or public ways within its jurisdiction, whilst the Commission which has charge of a district containing within it the centres of those commercial interests which contribute largely to the greatness of the nation, and, whether viewed in relation to the enormous value of the property in land and buildings, the vast wealth deposited within it, the great population which spends the largest portion of its active life within its limits, and the unprecedented traffic which circulates on its highways, is of equal, if not superior importance with any other in the Metropolis,—has no such privilege accorded to it; and neither has the ancient Corporation of the

City from which the Commission emanates. Thus the Board, within whose jurisdiction so many schemes desire to obtain a footing, to which, indeed, every railway within the Metropolitan area is either directly or indirectly striving to get access, is obliged to pay fees for permission for itself or officers to inspect documents relating to matters so widely affecting that large and important section of the public, for whose interests it alone acts.

The Select Committee of the House of Lords upon the Metropolitan Railway Communication, in its third Report (1863), advised that copies of Plans and Bills of all works affecting the Metropolis should be deposited with the Metropolitan Board of Works, and the Commissioners of City Sewers, who should, if they thought fit, present reports to Parliament on any of the proposed schemes; the privilege of receiving plans and bills has already been conceded to the Metropolitan Board of Works, and the interest of the Metropolis demands that a similar concession be extended to the Corporation.

I have the honour to remain,

GENTLEMEN,

Your most obedient Servant,

WILLIAM HAYWOOD,

Engineer.

N.B.—Since portions of this Report were in manuscript or in type, some of the projects have either been withdrawn or have not passed Standing Orders.

The following is a list of such up to 2nd of February:—

	Described at Page.	No. upon Map in Appendix.
Blackfriars Embankment, Roadway and Railway	10	17
East London Railway—(Thames Tunnel Line)	12	74
London Low Level Railway	24	153
London Union Railways	35	155
North and South London (High Level) Junction Railway	48	187
Thames Viaduct Railway	52	260
Tower Subway	63	375

Others of the projects may also be withdrawn—it is rumoured, however, that one or two of those in the above list which have not succeeded in passing Standing Orders, it is likely will overcome that difficulty, and may yet go before the Legislature.

W. HAYWOOD.

STANFORD'S LIBRARY MAP OF LONDON AND ITS SUBURBS

94 N° 2



SCALE: 6 Inches to 1 Eng. Statute Mile; on 1 inch to 880 Feet; on as 1:10560 on the Ground.

22

REPORT
TO THE
SPECIAL GAS COMMITTEE
OF THE
HONOURABLE THE COMMISSIONERS OF
SEWERS OF THE CITY OF LONDON,
ON THE
EXISTING CONDITIONS AND CIRCUMSTANCES
AFFECTING THE
GAS SUPPLY
IN THE
CITY OF LONDON.

BY
W. HAYWOOD, M. INST. C. E., F. R. I. B. A.,
ENGINEER AND SURVEYOR TO THE COMMISSION,

AND
H. LETHEBY, M. B., M. A., PH. D., &c.,
MEDICAL OFFICER OF HEALTH AND GAS ANALYST
FOR THE CITY OF LONDON.

10TH DECEMBER, 1864.

M. LOWNDS, PRINTER, FENCHURCH STREET, E.C.

1865.

*At a Meeting of the Special Gas Committee
of the Honourable the Commissioners
of Sewers of the City of London, at
the Guildhall of the said City, on
the 10th day of December, 1864.*

The Engineer, and Medical Officer of Health,
laid before the Committee a Joint Report, as under:

IT WAS ORDERED—

To be printed and a Copy sent to every
Member of this Committee.

JOSEPH DAW,
Principal Clerk.

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REPORT

TO THE SPECIAL GAS COMMITTEE OF THE HONOURABLE
THE COMMISSIONERS OF SEWERS OF THE
CITY OF LONDON,

ON THE

GAS SUPPLY

IN THE

CITY OF LONDON.

TO THE SPECIAL GAS COMMITTEE OF THE COM-
MISSIONERS OF SEWERS OF THE CITY OF
LONDON.

SEWERS' OFFICE, GUILDHALL,

10th December, 1864.

GENTLEMEN,

In compliance with your direc-
tions, we have prepared, and beg to lay before
you, such information as appears to us may be
useful to you, and the Commission, in considering
the various points relating to the Gas supply in the
City of London; and, in order that the true
position of the subject may be fully appreciated,
we have considered it advisable to give a brief
account of the condition of Gas affairs in the City

prior to the passing of the Metropolis Gas Act of 1860, that being the Act which has so seriously affected the citizens; and, as the Report contains reference to the various observations that have been made by us, and reported on, during the last few years, it will also be a record of matters which the Commission and the various Committees have had under their consideration during that period.

Companies
supplying the
City.

The three Companies now supplying Gas in the City are,—

The Chartered Gas Company, incorporated in 1810.

The City of London Gas Light and Coke Company, incorporated in 1817.

The Great Central Gas Consumers' Company, incorporated in 1851.

Districts allotted to the first
Companies.

Originally each of the first two Companies had powers to supply Gas throughout the whole of the City; but in the year 1822, Sir William Congreve, who was appointed on the part of the Government to inquire into the lighting of the Metropolis, advised that

districts should be assigned to them. This, however, was opposed by the Companies, and especially by the City of London Gas Company; although in the following year, namely, in 1823, an Act was passed in opposition to their wishes, whereby districts were allotted to them.

The boundary line of the districts, to be supplied by each of the two Companies was so well defined, that no attempt at infringement or alteration of it has since been attempted; so that, from 1823 to the present time, the northern district of the City has been supplied by the Chartered Company, and the southern by the City of London Company. (See Plan in Appendix, page 92.)

Plan of districts.

It followed, therefore, when this Commission, having charge of the highways of the City, annually advertised for tenders for lighting the public lamps, that, as no other Company had pipes within the City, and as the area of supply by each of the two Companies was defined by the Act of 1823, there was, practically, no competition; for each Company tendered only for the supply within its own district, and thus the Commission had no alternative but to accept the tenders offered,

Tenders for lighting public lamps.

unless, indeed, they resorted to some other mode of illumination.

Results of
system upon
supply of Gas
to the Citizens.

Price of Gas
reduced from
15s. to 6s.

At first sight, nothing would appear to have been gained by this annual form of proceeding, but the real effect of it was, that, as it periodically brought the Companies before the public, it gave the Commissioners the opportunity of demanding those restrictions with regard to price and supply, which competition was creating in other parts of the Metropolis beyond the City; and, practically, the result was that, between the years 1823 and 1848, the price of Gas was reduced by both Companies, from 15s. to 6s. per 1,000 cubic feet, and the charge for the public lights from £5. 5s. to £4. 4s. for 5-foot burners, and from £3. 3s. to £2. 14s. for the 3½-foot burners. (See Table I., page 94, Appendix.) While, therefore, the system of annual tendering was really of advantage, by causing a reduction in the price of Gas, the plan of districting was also beneficial, by securing the citizens from the annoyance occasioned by repeated disturbance of the public way.

Price of Gas
complained of
prior to 1848.

It is right, however, to say, that for some years previously to 1848, much dissatisfaction existed in the City with regard to the price of

Gas; and, in that year, the dissatisfaction had so greatly increased, that strenuous efforts were made by the Commission to induce the two Companies to lower the price to 4s. per 1,000 cubic feet; but its efforts were wholly unsuccessful, for both the Companies positively and definitively refused to yield to them.

This led to the formation of the Great Central Gas Consumers' Company; and, in 1849, a Bill was brought into Parliament for its incorporation. The Bill was rejected, on account, as we believe, of some technical difficulty; but it became clear, from the inquiry which was instituted, that the citizens had good ground for complaint, and that, being in earnest, they would, ere long, accomplish their purpose, and establish a competitive company.

Great Central
Gas Consum-
ers' Company
formed.

This was soon perceived by the other Companies, for at Midsummer, 1849, they reduced the price of Gas to 5s., and at Christmas of the same year, to 4s. per 1,000 cubic feet. (See Table I., page 94, in Appendix)

Price of Gas
reduced to 4s.
per 1,000 cubic
feet.

But, for all this, the Great Central Company persisted in its labours, and, in 1850, it made another application to Parliament. This time

Great Central
Company lay
pipes in 1850.

also it was defeated, but it nevertheless, in the same year, began to lay pipes within the City, (having obtained leave to do so from the Commission upon the 7th December, 1849), and it also began the formation of its works at Bow Common.

Obtain their
Act in 1851.

Thus fortified by the support of the Commission, the Company again applied to Parliament, and in the year following (1851), it obtained its Act of Incorporation, as "The Great Central Gas Consumers' Company."

Agreement as
to price be-
tween Great
Central Com-
pany and Com-
mission.

All the evidence adduced by the Great Central Company, during its struggle for existence, was to the effect, that there was a practical monopoly in the supply of Gas to the City, and that the price paid for it was excessive. The calculations of the new Company set this forth in very unmistakable terms, and it was demonstrated that Gas could be profitably sold at a maximum price of 4s. per 1,000 cubic feet. With the view, therefore, of enlisting the sympathy of the citizens, and gaining the support of the Commission, the Company entered into an undertaking never to charge more than 4s. per 1,000 cubic feet for Gas. In fact, this undertaking was given to the Commission before the pipes were per-

mitted to be laid down, and it was ratified by an indenture between the Commission and the Company, on the 12th of February, 1850. (The Company was then only registered under the Joint Stock Companies' Act), but in the Act of 1851, this sum was fixed as the maximum price of Gas.

As soon as the Act was obtained, the works of the Company were pushed on with great rapidity; and, before the close of the year, the Company had not only commenced a supply of Gas, but it had also secured its first contract for the public lighting of the whole City.

Great Central
Company supply
public lamps in 1851.

From that period until 1861 the monopoly of supply was at an end, for, although the City and Chartered Companies had pipage only within their respective districts, the Great Central Gas Consumers' Company had its mains throughout the entire City. Competition, therefore, necessarily ensued, and Gas was supplied everywhere, for about ten years, at a maximum price of 4s. per 1,000 cubic feet. There was, also, competition in respect of quality, for, although the Act had fixed the quality at twelve wax candles, the competition soon raised it to at least fourteen candles.

Four shillings
per 1,000 con-
tinued until
1861.

Reduction in price in Metropolis generally.

And the citizens were not alone the gainers by this Act; for the results obtained by it, in the City, furnished an example to the surrounding districts, where it not only caused a corresponding reduction in the price of Gas, but it also led to many important radical changes in the commerce and manufacture of it throughout the whole Metropolis.

Combination of Metropolitan Companies to arrange districts in 1857.

In fact, for nearly ten years there was a continued agitation of the subject; and the questions of illuminating power, chemical purity, price, and mode of supply, largely occupied the attention of the Metropolitan Local Boards. The result of all this was, active competition; but, in 1857, it became generally known that certain of the companies were endeavouring to arrange among themselves districts of supply, with the view of checking this competition, and of advancing the price of Gas.

Objection by consumers to districting Companies.

This strengthened the local agitation, and delegates, from various parishes, met to organise joint action and defence against the threatened monopoly. The coalition of the Metropolitan Gas Companies was at once extended, and there is no doubt, that their power and influence, always great, were still further

increased by the assistance received from the Gas Companies throughout the kingdom.

Protracted investigations, before select committees of the House of Commons, took place in 1859 and 1860, and these resulted in the passing of the Metropolis Gas Act of 1860, the main provisions of which are,—the assignment of districts of supply—the annihilation of competition—a maximum charge for Gas, subject to reduction under certain conditions—a minimum illuminating power—and greater chemical purity.

The Metropolis Gas Act passed in 1860.

It may be averred that the obligations in respect of illuminating power and purity, which were imposed by the new Act, might have been obtained, equally well, by the aid of competition; and it is not unreasonable to suppose, that if the price of Gas had been left to the same agency it would have been much lower than it now is. Looking, therefore, at the practical results of the Act, it may be said, that the only benefit derived from it is, the avoidance, in a degree, of the breaking up of the public ways.

Benefit actually gained by ratepayers by passing of Metropolis Gas Act.

The Act was originally promoted by the local authorities, but it underwent so great a change

The Act originated with local authorities.

ties, but ended while it was in committee, that it was finally in being the passed against the wishes of the Metropolitan Act of the Gas ratepayers; and there is, perhaps, no instance Companies. in which, on the one hand, local agitation has been so barren of profitable results, and in which, on the other, a combination of capital and political influence has been so successful.

Special
circumstances
of City in
respect of
Gas supply.

It must not be forgotten, however, that the City was in a different position from the rest of the Metropolis, for the districts of two of the Companies were already well defined, and it was hardly possible to assign a separate district to the third Company, inasmuch as it had already laid its mains throughout the entire City, and was largely supplying Gas within the districts of the other two. Besides which, there were no outlying districts to supply, and the inconvenience of seriously disturbing the public ways had been already submitted to, and was, practically, at an end. Moreover, as regards price, one Company was already bound by Act of Parliament to a maximum charge of 4s. per 1,000 cubic feet, and this really controlled the price charged by the other Companies.

City was satisfied with Gas at 4s. per 1,000 cubic feet.

The City, therefore, had all it desired in this respect; and, as to an improvement of quality,

it might safely have been left to the influence of competition, for it was from quality alone that each Company could expect success. And here we may mention, that the Great Central Company's Gas was always subject to the examination of Dr. Letheby, who was the chemical referee appointed for that purpose by the Court of Common Council, and who regularly reported on the quality of the Gas to the Commission. As long, therefore, as the Great Central Gas was pure, and of the statutory illuminating power, neither of the other Companies could afford to supply Gas inferior to it.

This was the condition of things from 1850 to 1860, and the citizens generally were well satisfied with it; and the Commission,—
 knowing how it had aided the Great Central Gas Company in its infancy,—that, in fact, it was to its indulgence and support that the Company owed its existence; knowing, also, that the Company had bound itself never to raise the price of Gas above the charge sanctioned by Parliament, namely, 4s. per 1,000 cubic feet,—had no idea that those stipulations would be abrogated. This, however, was the case, for although the Commission (acting under proper advice),

And satisfied with its then existing arrangements generally.

did not appear to consider the City was included in the Bill in respect of price, yet it appears to have been so; and thus the labours of the previous thirteen years were partially annulled; and, on the 31st January, 1861, when the Metropolis Gas Act came into operation, the Gas supplied to the City was raised from 4s. to 4s. 6d. per 1,000 cubic feet.

Price of Gas
increased in
City by the
Metropolis Gas
Act.

From that time to the present the price of Gas in the City has been $12\frac{1}{2}$ per cent. higher than it was for a period of twelve years previously; and, although it was said that, in return for this increase in price, the Gas would be chemically purer, and of a higher illuminating power, than it had been before the passing of the Act; yet, as will be seen in a subsequent part of this Report, (Table, page 67), the purity prescribed by the statute has rarely been obtained, and the illuminating power is not so high as it was in the early days of competition, when Gas was supplied to the citizens at 4s. per 1,000 cubic feet.

Aggregate in-
creased charge
to citizens.

Thus, therefore, whilst the gain in purity and illuminating power has been, to say the least of it, negative or uncertain, the increase

of price has been positive: so positive, that perhaps a sum of £25,000 a-year will hardly cover it; for, if we are right in assuming that there has been an increase of 40 per cent. in the private consumption of Gas in the City since 1856, when the quantity was about 690,000,000 of cubic feet per annum, there is now consumed 1,000,000,000 of cubic feet; and these, at 6d. per 1,000, give a sum of £25,000 per annum as the excess of price paid by the citizens over that of former years.

The Commission used its best endeavours to prevent this; for, looking at the special circumstances under which the Act was obtained, it had grave doubts whether the provisions of the new Act could be enforced by the Great Central Company within the City, and they took Counsel's opinion thereon. This opinion was but partially favourable to the views of the Commission; ultimately proceedings (The Great Central Gas Consumers' Company *v.* Clarke) were taken in the Court of Common Pleas, at Westminster, for the purpose of testing it, and on the 6th of December, 1862, the Judges of that Court decided, that the Act did apply, in all its force, to the City, and that the Great

Judges in
Court of
Common Pleas
decided the
City came
under all
provisions of
Metropolis
Gas Act.

Central Company was empowered to charge at the advanced rate of 4s. 6d. per 1,000 cubic feet, and this judgment was, subsequently, confirmed by the Court of Exchequer Chamber.

Charge for
public lamps

The cost of the public lamps (see Table I., page 94, Appendix) has also been largely increased. Those with 5-foot burners, which, at the date of the formation of the Great Central Gas Company, and for some years previously, had cost the Commission £4. 4s. per annum, were contracted for by that Company, in 1851, at £3. 17s. 6d., and by the Chartered Company, in the following year, at £3. 12s. In 1853 the Great Central Company lowered the price to £3. 3s. per lamp, per annum, and the Chartered to £2. 19s. 6d.; but, in 1859, the cost was increased to £4. 10s. per lamp, and now, in 1864, the same lamps are charged at the rate of £5. 9s. 6d. per lamp by the Chartered, and £5. 8s. 6d. by the Great Central Company.

is higher in
1864 than in
1823.

It is proper to state that in 1823, when Gas was at a monopoly price, the charge per lamp was only £5. 5s. to the Commission; the contract price, therefore, for the public lamps is, at the present time, higher than it ever has been during the last forty years.

The 5-feet burners are now (1864) charged—

4.29	per cent. dearer than in	.....	1823
15.87	„	„	1827
21.66	„	„	1832
30.36	„	„	1844
41.29	„	„	Gt. Central Gas Co.'s price in 1851
52.08	„	„	Chartered Gas Co.'s price } 1852
41.29	„	„	Gt. Central Gas Co.'s price }
84.03	„	„	Chartered Gas Co.'s price } 1853
73.81	„	„	Gt. Central Gas Co.'s price }
33.54	„	„	Chartered Gas Co.'s price } 1856
30.36	„	„	Gt. Central Gas Co.'s price }
24.43	„	„	Chartered Gas Co.'s price } 1859
21.66	„	„	Gt. Central Gas Co.'s price }
15.87	„	„	Chartered Gas Co.'s price 1862

And the small burners are charged at about the same proportion.

From the period when Gas was first used in the public lamps, until recently, the Companies supplying them have, no doubt, dealt liberally with the Commission, for the ample light which was formerly given is well recollected by those officers under whose observation it mostly came; indeed, it is only within the last few years that the diminished light has become a matter of public notoriety, and the subject of incessant complaint by the citizens.

Liberal supply of Gas given formerly to public lamps.

Which is not
the case now.

That the quantity of light has seriously fallen off there can be no doubt; and it has been deemed expedient, as will be presently shown, to resort to experiment, for the purpose of determining, accurately, whether or not the stipulated quantity of Gas is really given. Not that such experiments are at all necessary to show how different is the light at the present time from what it formerly was, for this is a matter of common observation and common complaint. Moreover, this deficiency of light has been noticed, not only where carburettors have been employed, but throughout the whole of the City. On the other hand, the superiority of the light given by the lamps in other districts of the Metropolis, has also been a subject of remark by all classes of persons; although much evidence has been adduced, of late years, to show that, even in those districts, the light given by the public lamps is not what it should be.

Falling off
began proba-
bly in 1853.

It is our opinion, that the falling off in the intensity of the public lights dates as far back as the year 1853, when the charge for the public lamps was at the lowest point, and when the contracts for lighting were held by the Chartered and Great Central Companies;

for, in a report made during that year, your Engineer recommended the employment of a special officer, to ascertain pressures, and to check the discharging powers of the burners; but, as there was no general public complaint of defective lighting at that time, the Commission did not consider such an appointment necessary, and, therefore, it may be fairly inferred that no large grievance in this particular was felt.

A few years afterwards (about 1857), ^{Complaints began about the year 1857.} complaints of the public lighting began to be more urgent, and these were referred to by your Engineer, in his Annual Report for the year 1858.

At that time the defective lighting was ^{Still more so subsequently.} a matter of special consideration by the Commission; for, while in former years no serious complaints had arisen, and therefore no arrangements had been made to ascertain if the contracts of the Gas Companies had been fulfilled, it was now evident that supervision was needful. Accordingly, in 1860, the late Commissioner of City Police (D. W. Harvey, Esq.), was requested to report to the Commission whenever the police observed a defective light. This he undertook to do partially, and

the gravest defects were reported by him periodically; but the general deficiency of light—that which was becoming a matter of public anxiety—he did not consider to be a proper subject of observation by the constables. Since then other measures have been taken, which will be found under the head of consumption of Gas at the Public Lights (page 30).

The carburetting process experimented upon in 1861.

In the spring of 1861, directly after the passing of the Metropolis Gas Act, the carburetting process was brought under the notice of the Commission. It was alleged by the Patentee (the Manager of the United Kingdom Carburating Gas Company), that a saving of £2. 3s. 6d. per lamp, per annum, would be effected; and it was also stated, by certain professional men of good reputation, that the process was practicable and economical. The Commission, therefore, ordered the subject to be investigated.

Results of experiments satisfactory.

Accordingly an experiment, extending over the period of one month, and conducted with sufficient care, was made. The situation selected was Moorgate Street, and the number of Lamps was 12. An officer of the Chartered Gas Company co-operated with the officers of the Commission, and he expressed himself satis-

fied with the correctness of the results. These were reported to the Commission on the 30th July, 1861. In that report it was stated that, under certain conditions, which were named, the saving that might be anticipated by the adoption of the process would be about £1. per lamp, per annum; and as there were 2,884 gas lamps in the City, a saving of an equal number of pounds annually might be hoped for. As this Report may be needed for reference, it is appended. (Appendix, page 75).

At a later period of the same year, with the view of economising Gas at the public lamps (for it was all but officially notified that the price of Gas to them would be still further increased), it was determined so to frame the specifications for the new contracts for public lighting (1862), that the Commission might, if they thought fit, adopt the carburetting process; but, when the tenders of the Gas Companies were opened, it was found that the terms of the specifications submitted to them were altogether declined, as being more stringent than before, and involving the Companies in responsibilities which they were not desirous of undertaking: but the Companies tendered to light the public lamps on the terms of the former (then existing) contracts, excepting so

Commissioners determine to try same in one district, (1861).

far as the terms were necessarily altered by the Metropolis Gas Act of 1860.

The prices for public lamps increased in the year 1862.

As had been anticipated, the whole of the Companies increased their prices, and thus the Commission had the first results of the Gas Act of 1860. The tender of the Chartered Gas Company for the northern, and that of the City Gas Company for the southern districts, for the year 1862, were accepted. For prices see Table I., page 94, Appendix).

Carburetting process adopted by Commission in southern district.

The Commissioners then determined to adopt the carburetting process at the lamps in the southern district, taking upon themselves the responsibility consequent upon their so doing; although they were aware that it could neither be worked so well, nor so economically, as by the Gas Company. When this determination was made known to the City Company, it declined altogether to supply Gas to the lamps within the district assigned to it, (although its tender had been accepted). It is true that the Commissioners might have compelled the Company to supply the Gas, according to their accepted tender, but they were not desirous of beginning the use of a process with what was, practically, the openly avowed hostility of the Company to it; they, therefore, obtained

The City Gas Company refused to supply Gas if the Commission carburetted.

another tender from the Great Central Gas Company, and arranged with the Carburating Company to apply the process to the public lamps in one of the districts only.

When the contracts were taken, it was expected that the lamps would have been fitted with the apparatus, and the process brought into full operation, by about the end of March, 1862; but the Gas Company insisted on certain fittings and arrangements being made, which were not merely useless, but were actually mischievous; for they had the effect of putting the Commission to unnecessary expenses; they rendered the apparatus more unsightly than it need have been; and they seriously increased the difficulty of applying the process. In consequence of this, the whole of the lamps in the district were not fitted with carburettors until the end of May.

We cannot say that, in our opinion, the Carburating Company acted so energetically as it should have done, seeing that it had to establish a process in public estimation; but the Company alleges that, at the very outset, the cost of fitting the apparatus was doubled by the obstacles interposed by the Gas Company, and that it was thwarted by it in every

Carburettor
apparatus fit-
ted up in 1862.

Strife between
Carburating
Company and
Gas Company.

possible way. It would occupy much time to detail the various allegations made on both sides, but it may be said that whenever a defective light was reported to the Commission, it became the subject of recrimination. The Gas Company almost invariably stated that it was owing to the carburettor, and the Carbureting Company replied, that an inadequate supply of Gas was furnished to the apparatus, and that it was purposely put out of order by the Gas Company.

Price of public lamps further increased in 1863.

In the year following, namely, in 1863, the Commission had to pay a still further increased price for Gas, the contracts being taken by the Great Central and Chartered Companies; and both of them declined, as in the previous year, to be bound by the specifications and conditions prepared by the Commission.

Commission continue carbureting process.

During that year the Commission undertook the carbureting of the Gas in the southern district, by its own agents, and they effected a saving of about £1,000.

Meters fixed to lamps in 1862.

In the course of 1862, meters had been fixed to various lamps in different parts of the City; and, during 1863, repeated observations were made of the condition of the light. We have reason to think that the

result was comparatively satisfactory, for the public lighting during that year was better than it had been for many years previously, and there were fewer complaints respecting it.

Towards the end of the year 1863 the Commission, as usual, requested tenders from the three Companies, for the public lighting for the year 1864, and, as before, specifications with the ordinary conditions were prepared; but the Companies took no notice whatever of the specifications, and merely stated that they tendered under the conditions of the Metropolis Gas Act. The price for 5-foot burners was not advanced, and the price for 3-foot burners was advanced slightly, but the Commission had no alternative but to accept those terms.

Tenders for
lighting, year
1864.

This brings us to the close of the present year, and it must be admitted, that the gas lighting of the City, during the year 1864, has not given public satisfaction. In fact it is strongly felt, that, unless the Commission can itself undertake the lighting, cleansing, and the whole charge of the public lamps, not only is there no chance of the success of a new process for economising the supply of Gas, but there is also but little prospect of any improvement

Lighting has
not given sa-
tisfaction.

in the quantity of the light, or of any satisfactory arrangement, or agreement, between the Companies and the Commission.

Having thus set before you the principal facts relating to the history of the Gas Supply in the City, during the last forty years, we will now submit to you the results of some of the investigations made on the public lighting during the last four years, and the measures taken, from time to time, by your Honourable Committee in reference thereto.

CONSUMPTION OF GAS AT THE PUBLIC LAMPS.

Carburetting
process appli-
ed in 1862.

At the end of May, 1862, the carburetting process was applied, as we have already stated, throughout the southern district of the City; and soon afterwards, in consequence of complaints of deficiency of light, we were directed to ascertain whether the deficiency was attributable to an insufficient supply of Gas, or to the fault of the Carburating Company. We, therefore, had meters attached

to a number of lamps, situated at all levels in the City. Meters fixed in 1862.

26 were affixed to columns.

8 were placed beneath the ground, at the base of the columns. Their situation.

4 were attached to the brackets of the lamps projecting from the walls.

The first meter was attached on the 2nd of September, 1862; 36 by the end of the month, and the last was fixed on the 21st of October.

The distribution of them was as follows:— Their distribution.
7 were fixed to lamps, with 5-feet burners, supplied with Gas by the Chartered Company.

31 to lamps, with 3-feet burners, supplied by the Great Central Company. These were all lamps with carburettors.

In the course of nearly 7 weeks, namely, from the 2nd of September, to the 25th of October, the following average of consumption was registered.

For the first three nights after the meters were fixed— Gas consumption registered by meters.

	Cubic feet per hour.
20 meters to the 3-feet burners, showed a consumption of	2·59
11 ditto	3·33
6 ditto to the 5-feet burners, ditto	4·68

The twenty meters to the 3-feet lamps then began to register, like the other eleven, more than the stipulated quantity of Gas; but those to the 5-feet lamps continued to register, without marked alteration, an average of less than five feet an hour.

In the whole time of seven weeks, the average registrations were as follows:—

	Cubic feet per hour.
The 3-feet burners consumed	3·35
The 5-feet ditto „	4·69

Irregular consumption of Gas at public lamps.

But, although these are recorded as the averages of the whole time, nothing could be more irregular than the respective consumptions at the different lamps; for example—

	Cubic feet per hour.
The 3-feet burners had a range of from 1·83 to 6·30	
The 5-feet ditto	3·65 to 7·31

Other irregularities.

Other irregularities were also observed and recorded, thus—in some lamps, less than the

stipulated quantity of Gas was consumed for a few days, and then, for a few more days, a large increase of consumption took place, falling afterwards to the average quantity. In other instances, unusually large quantities of Gas passed through the meters between the times of observation; and this can only be accounted for, either by those lights burning earlier and later than was required by the contract, or by escape of Gas during the day: in one case, as much as 20 cubic feet of Gas passed through the meter during the day.

In consequence of these irregularities, the light given at the public lamps was subject to great variation; and this may, in some measure, account for the different views occasionally expressed as to the lighting in different districts of the City.

Consequent
variations in
amount of
light afforded.

Again, it was a matter of observation, that there was a manifest difference between the light given by those lamps *with* meters and those *without*; accordingly, in October 1862, we took circuits of inspection, and made experiments to ascertain the distance at which a given object was visible. These observations were made on several occasions, between the hours of 8.30 P.M. and midnight; they

Difference be-
tween lights
with and with-
out meters.

were 125 in number, and the results were as follows:—

	STRENGTH OF LIGHT.	
	Without Meters.	With Meters.
	Yards.	Yards.
At lamps with carburettors (3 cubic feet per hour, contract supply)	4.378	5.512
At lamps without carburettors (5 cubic feet per hour, contract supply)	4.758	5.925

These results show, that of the lamps *with carburettors*, those with meters give about 58 per cent. more light than those without meters.

And of the lamps *without carburettors*, those with meters gave about 55 per cent. more light than those without meters.

In all cases, therefore, there was a very much better light from the lamps with meters than from those without them.

Light given by
lamps without
meters.

After the foregoing observations had been presented to the Special Gas Committee, we made other experiments, on lamps which had not meters permanently affixed to them. These investigations were made with the view of ascertaining the actual consumption of Gas at the public lights generally, and they were conducted with the greatest care, by attaching

an accurate experimental meter to the burners. Every means, indeed, was taken, by previous testing, to ensure accurate results, and the following are the results:—

IN THE GREAT CENTRAL DISTRICT. — (Contract quantity 3 cubic feet per hour.)

The mean of 5 *feeble* lights in Farringdon Street gave 2.88

„	25 lights, being the <i>whole number</i>	
	<i>in Fleet Street</i>	2.55
„	10 ditto in Skinner Street	2.86
„	4 ditto in Snow Hill	2.61
„	2 ditto in Well Court	2.94
„	2 ditto in Bucklersbury	2.26
„	19 ditto in Up. Thames St., from } Queen Street to Addle Hill }	2.63

The average being 2.64

IN THE CHARTERED DISTRICT.—(Contract quantity, 5 cubic feet per hour.)

The mean of 4 *feeble* lights in Aldersgate Street gave 2.94

„	8 <i>feeble</i> lights in Bishopsgate Street „	3.41
„	1 <i>ditto</i> in New Broad Street „	3.09
„	1 <i>ditto</i> in Liverpool Street	3.00

The mean of 6 lights, being the *whole in Little*

	<i>Moorfields</i>	gave 3·00
„	4 ditto, Princes Street	„ 3·93
„	5 ditto, Cornhill	„ 3·76
„	8 ditto, Leadenhall Street	„ 4 00
„	14 ditto, Moorgate Street	„ 4·15
	The average being	3·76

All of these observations were made in the month of December, 1862.

Now, although, as we have stated, some of the experiments were made on the lamps emitting a feeble light, and may therefore be regarded as more or less exceptional, yet in other cases, where all the lamps in the street were tested, it may be assumed that the results give a fair average of the general lighting of the whole of the City; and the results show, that the Great Central Company was at that time giving *12 per cent. less Gas, and the Chartered Company 25 per cent. less Gas than the contract quantity.*

Gas Companies impugn correctness of the observations.

The reports of all these observations were printed by the Commissioners, and copies of them were sent to the Gas Companies; but, at subsequent meetings of the Commission, reports were made by the Companies, complaining of these returns, and stating that their

officers had found a much larger supply of Gas to the public lamps than we had. We have, however, only to remark, that our observations were made with great care, and with instruments which had undergone the most searching tests to ensure their accuracy. We believe, therefore, that our results were, in every particular, correct.

But it is very probable, that, as a month elapsed between the time of our experiments and those of the Companies, a very different condition of things existed; for, independently of the circumstance that the burners may have been opened in the process of cleaning, or may have been changed altogether, there was a manifest improvement in the quantity of light in all parts of the City shortly after the publication of our Report. Without, therefore, entering into any explanation of the probable cause of the differences in our results and those of the Companies, we may safely say, that no reliance can be placed on the comparative value of tests made at an interval of a month. In illustration of this, we may refer to the results of our own more recent testing of the light at the public lamps, in February, 1863, when we continued, or rather repeated the observations which we

Gas Companies' experiments made at later date than those of the Commission.

Different results on 12th February 1863.

made in 1862. These observations were fifty-six in number, and were, like the former, made between the hours of 8.30. p.m. and midnight. They stand on record thus:—

	STRENGTH OF LIGHT.		
	October, 1862. Yards.	February, 1863. Yards.	Per Cent. of increase. February, 1863.
<i>Lamps with Carburettors.</i>			
With Meters	5·512	6·75	50·06
Without Meters	4·378	6·53	123·24
Mean	4·945	6·64	86·65
<i>Lamps without Carburettors.</i>			
With Meters	5·925	6·25	11·46
Without Meters	4·758	5·65	41·48
Mean	5·341	5·95	26·47

Inconvenience
of informing
Companies
when observa-
tions are about
to be under-
taken.

So that the lights had been increased in all parts of the City; but the Companies disputed this fact, and requested that their agents should be present at the time when we were making our examinations. To this we say that, however desirable it is to have such assistance in the conduct of these inquiries, there are almost insuperable objections to it; for, in the first place, it would be necessary to give the company some hours' notice of our intention to make experiments, and this, undoubtedly, would

give uncertainty to the results, if, indeed, it did not altogether frustrate the object of the inquiry; and, in the next place, it would be almost impossible to make a sufficient number of experiments, for any practical purpose, in the course of a night, if every experiment had to be repeated, again and again, for the satisfaction of those who were looking on.

There is but one way, indeed, in which the difficulty may be met, and that is, by testing the burners at given pressures; but even this would hardly secure reliable results, for the consumption of the burner at the lamps is dependent, not only on the pressure in the main, but also on the extent to which the tap is turned, and likewise on the condition of the burner itself. If, therefore, this process of inquiry were followed, it must be conducted with a stipulation, that the pressure at the burner is kept uniform, and that the tap is always turned fully on.

As to testing
burners under
pressure.

Since the foregoing observations were recorded, others have been made from time to time, and, as before, with very variable results. (See Tables III. to IX., pages 97 to 107, Appendix).

Subsequent
and recent ob-
servations.
(1864).

One thing is, however, certain, that where the meters are permanently fixed to the lamps the full quantity of Gas, and often far more than the full quantity, is on the average given; but even to these, which are perhaps looked after by the Gas Company with special attention, the supply of Gas is given very unequally, for it frequently falls below the average at some meters for a week or two, and then rises to the proper quantity. This will be seen by the three Tables, showing one week's consumption at lamps to which meters are attached (See Tables, III., IV., and V., pages 97, 98, and 99, Appendix), an abstract of which is as follows:—

Table showing the extreme variations in the quantity of Gas consumed at the public lamps with meters.

Name of Company supplying.	Contract Quantity, cubic feet per hour.	No. of Lights experimented upon.	Actual Consumption varying	
			From cubic feet per hour.	To cubic feet per hour.
Great Central Co..	3	33	2·16—	4·39
Chartered Co.	3	21	2·45—	3·84
Ditto	5	11	3·40—	6·48

Noticeable difference between lamps with and without meters.

This difference in the light of the lamps with and without meters, is still a matter of common observation; for it is manifest to the naked eye, and our experiments confirm the

opinion, that the full quantity of Gas stipulated for is not generally supplied when there are no meters.

In the years 1863 and 1864, new lamp posts were erected in certain streets in the City, and all of them have carburettors placed within their bases. As the pipage to these lamps is perfectly new, and the supply of Gas is therefore, in this respect, delivered under the best conditions, we have selected them for the observations in the southern district; and in the northern district, some of the most important streets have been selected.

New lamp posts designed and fixed for first time in 1863.

If, therefore, these observations are taken as an average for the whole City, it follows, that in the *Northern district* 10·20 per cent. less than the contract quantity of Gas is given; and in the *Southern*, 11·66 per cent. less.

Quantity of Gas burnt annually in the public lamps.

AS TO METERS TO PUBLIC LAMPS.

At various periods, prior to 1862, and subsequently, we have stated our opinion, that the fixing of meters to the lamps was the only satisfactory way by which the consumption of Gas could be ascertained, and the contract

Meters recommended to public lamps.

quantity secured. The Commission, therefore, on consideration of antecedent, as well as current circumstances, determined to burn Gas at the public lamps, in future, by meter only, and also to acquire the whole of the pipage, and to undertake the lighting, cleansing, and repairs of the lanterns.

Commission determines to affix a meter to each lamp.

Towards the end of 1862, the Commission further determined, that it was preferable to affix a meter to each lamp, rather than to continue the existing system; but, as the season was bad, and as the time before the new gas contracts commenced was exceedingly limited—too limited for procuring and affixing meters, and making all other requisite arrangements, they determined, in the first instance, to affix meters in the southern district only, that being the one where the Gas was carburetted, and where it was necessary, for the fair trial of the system, that the full contract quantity of Gas should be given.

Tenders received for meters.

Specifications were accordingly prepared, and tenders received, for supplying and fixing meters to the lamps of the southern district of the City, and for lighting, extinguishing, cleansing, and repairing the lanterns. (See Tables X. and XI., pages 108 and 109, Appendix). One maker

alone tendered for the supply of the whole of the meters; and, as the Commission was led to believe that it was impossible, before the expiration of the existing contract, to prepare fully for the intended work, especially as there was but little hope that the Companies would offer any facilities for such a radical change in the mode of supply, and as questions arose concerning the best mode of fixing the meters, and the cost thereof, it was decided to postpone the work, and arrange with the Companies, for another year, on the old terms. Beyond, therefore, affixing a few additional experimental meters in various parts of the City, nothing decisive has yet been done in this matter.

Fixing meters postponed.

The approximate cost of meters to the public lamps may be seen by reference to the subjoined Table. (See Table X., page 108, Appendix.)

Cost of meters to the lamps.

The mode of fixing the meters is still a matter for consideration, and there are three methods which can be adopted.

Modes of affixing meters to public lamps.

1stly. By attaching them to the brackets of the lamps projecting from the walls, and upon the ladder-irons of the lamp posts.

2ndly. By sinking them in wells or pits, which must be constructed for the purpose, beneath the ground.

3rdly. Where there are columns, by placing them in the base or lower part of the post, and this would involve the necessity of casting a new post.

Fixing upon
brackets and
ladder-iron of
columns.

Of these three modes, the first is undoubtedly the cheapest; and when the meters are fixed upon the brackets, and are placed close against the walls of the houses, they are scarcely noticed; but it must be admitted, that when they are attached to the ladder-irons of the lamp posts, they are not sightly, and they cast a shadow upon the ground.

Fixing them
beneath the
pavement.

The second plan is perhaps preferable to the first, for the meters are not only out of the way, but the position of them will define precisely where the pipage of the Commission begins and that of the Company terminates.

In the bases
of lamp-posts.

As to the third mode, we reported, in 1862, that it was very desirable to have new gas columns and new lanterns, of a handsomer and

improved description; for nearly all the present lanterns are very old, and in a most indifferent condition.

Since then these new columns have been designed, and they are capable of receiving a carburettor as well as a meter. 107, New columns will admit meters in their bases. or about $\frac{1}{8}$ of the whole number of gas columns in the City, have been replaced by these new columns; and experience proves that this mode is preferable to fixing the meters in the ground.

By way of reference, we have given a list of the situations where meters are at present fixed to the public lamps, and we have, also, Cost of meters. named the amounts which were tendered to the Commission for the supply and maintenance of meters. (See Tables VI. and X., pages 100 and 108, Appendix).

PRESSURE.

A few observations of pressure were taken Observations first made in 1862. at the public lamps towards the end of 1862, and it was found generally to be sufficient.

The details of the observations are given in the Appendix. (Table XII., page 110.)

The pressure was, upon the average, as follows:—

		The pressure had	
		A maximum of	A minimum of
Pressure.— General average of results.	In the District of the Great Central Gas Company ..	19 tenths	7 tenths
	In the District of the Chartered Gas Company	14 tenths	6 tenths

The pressures were taken between sunset and sunrise only.

It was observed, that in no case was there any loss of pressure by the application of the carburetting apparatus.

THE CARBURETTING PROCESS.

We have already described the circumstances attending the introduction of this process (page 24), and we hardly need say that the object of it was to economise Gas.

Object of introduction of carburetting process.

The experiment made in Moorgate Street, in 1861, was undoubtedly successful; and we have always been of opinion that the process might be advantageously applied, if care were used in its management. This will be amply illustrated by the facts detailed in the Appendix (page 81).

Experiment in 1861 successful

The Carburing Company estimated the saving per lamp, per annum, at £2. 3s. 6d.; but, from the experiment named, your Engineer estimated it at about £1 only. In December, 1862, when further experiments had developed the cost and capabilities of the process, it was estimated that the saving was about 19s. 6d. per lamp, per annum; the details of that estimate are as follow:—

Estimated saving by adoption of process.

COST OF PUBLIC LAMP-LIGHTING.—ESTIMATE SHOWING ANTICIPATED SAVING BY THE CARBURETTING PROCESS.

Lamps without Carburettors.

	£	s.	d.	£	s.	d.
22,000 cubic feet of Gas, at 4s.	4	8	0			
Lighting, cleaning, and repairs	0	15	0			
Cost per lamp, per annum, (5-feet burners) ..	*5	3	0			

Lamps with Carburettors.

13,000 cubic feet, at 4s.	2	12	0			
Lighting, cleaning, and repairs	0	14	0			
Filling Carburettors	0	3	6			
Naphtha	0	8	0			
Royalty	0	6	0			
Cost per lamp, per annum	4	3	6			
Saving per lamp, per annum	£0	19	6			

Estimating upon the same basis, with Gas at 3s. 6d. per 1,000 feet, the saving will be 15s. 0d. per lamp, per ann.

At 3s. 9d.	„	„	17s. 3d.	„	„
„ 4s. 3d.	„	„	21s. 9d.	„	„
„ 4s. 6d.	„	„	24s. 0d.	„	„

It is evident from this, that the higher the price of the Gas, the greater is the expected saving from the adoption of the carburetted process.

These estimates are based upon the assumption of the Commission lighting and taking the entire charge of the lamps.

The estimated saving is, therefore, very nearly the same as that made upon the information derived from the experiment in Moor-gate Street, in 1861, when the cost of applying and maintaining the process was very un-

* It is now (1864), £5. 9s. 6d. per lamp, per annum.

certain; for, owing to certain commercial circumstances at that date, the cost of a proper naphtha was difficult to arrive at, and it, subsequently, had to be specially manufactured for the Commission; naphtha was then expected to increase in price, which would have reduced the saving from the process. On the other hand, the royalty seemed very high, and open to reduction—but, since then, a larger amount of information has been obtained, and we still think that, if the Commission itself undertook the lighting, cleansing, and carburetting, the process would effect a saving of about £1 per lamp, per annum; and we are strengthened in this opinion by a consideration of the tenders received by the Commission for lighting, repairing, and carburetting, in 1863. These we append. (Table XI., page 109, Appendix).

In the year 1863 the Commission took the entire charge of the process. The naphtha employed was manufactured according to a specification prepared by your Medical Officer, and the saving per lamp, per annum, was, during the year, 12s. 6d. only; but, when we consider the difficulty and expense occasioned by two sets of workmen attending to the

public lanterns, we do not think that the estimates are at all invalidated by the cost of the process in 1863.

Complaints
against pro-
cess.

The complaints made against the process are, that the apparatus is ugly—that the process is dangerous—that the vessel containing the naphtha casts a shadow upon the pavement—that the rich flame smokes the lanterns—and that the lamps do not give sufficient light.

As to ugliness

It cannot be denied that the first complaint is well founded, for the appearance of the apparatus is not agreeable; but the carburettor would have been much less objectionable if it had been placed, as was originally intended, at the very base of the lanterns. This, however, was impossible, for the Gas Company demanded that cocks should be placed beneath the apparatus, and thus it was raised so high in the lantern, as not only to increase its unsightliness, but, also, to augment the shadow upon the ground. Since then a large number of carburettors have been bent to one side (by whom, amidst the conflict of statements, it is difficult to determine), and their ugliness is, thereby, much increased. That the shape of the carburettor

might have been considerably improved, there is no doubt, for the pear-shaped apparatus, subsequently put up in many places, has not been considered objectionable, especially when its proper position in the lantern is secured. Altogether, indeed, the objection on this head might, we think, have been obviated, had the Commissioners had the sole control over the pipes and fittings of the lamps.

As to the second objection, namely, that the apparatus is dangerous, from its liability to explosion, we believe that the objection is groundless; for, even when the naphtha has ignited, there has been no explosion, but merely a combustion of the naphtha within the lanterns; and, in all these cases, the ignition has been traced to the point of junction between the carburettor and the pipe beneath, and, we think, it was attributable entirely to the cock which the Gas Company insisted should be placed at that point, and to the loosening of the junction, by the movement of the carburettors when the Gas was turned off and on, and when the lamp was cleaned. In no instance, however, has there been any serious damage from this combustion: in fact, out of a total of 1,728 lamps in which the carbu-

rettors are placed, there have been only about 9 of these ignitions per annum. While, therefore, the danger from explosion is absolutely impossible, that from combustion is very remote, and it would be still more so, if the Commission had the sole charge of the lanterns.

As to shadow
cast by the ap-
paratus.

It is true, that when the carburettors are raised high up in the lanterns by reason of the useless cock, a shadow is cast upon the pavement, immediately underneath the lamp. Your Engineer drew attention to this, in his Report of the experiment in Moorgate Street, in 1861; but, after all, the real practical detriment to the efficiency of the light is not considerable, for the area of the shadow is but small, and the darkness is not absolute, but merely relative; moreover, with an apparatus of an improved shape, placed in the base of the lanterns, and with an elongation of the burners, the process might have been applied without much objection on this score, although, with the apparatus placed high up in the lanterns, the shadow is unnecessarily large.

As to the
smoking of the
lanterns.

As it is the duty of the Companies to keep

the lanterns clean, the Companies have, on a few occasions, complained that the carburettors caused a deposit of soot in the lanterns, and so rendered them unusually dirty. We found, on inquiry, that when the Carburating Company had charge of the process, they had, in some instances, placed caps over the burners, with a view of increasing the light from the naphthalised Gas. This caused a tailing of the flame, and a diminished supply of air to it, and, when the Commissioners themselves undertook the process, and used a very rich naphtha, these caps became still more objectionable, and occasioned a deposit of smoke on the glass of some of the lanterns. The cause, however, was at once perceived, and, when the caps were removed, nothing more was heard of the matter. The complaint, therefore, had certainly a foundation in fact, yet it was not very serious, for, out of 1,727 lamps, there were but twenty that had been blackened in the way described; and there is no reason why the carburetting process, if properly carried out, should not be entirely free from this objection.

That the lamps with the carburettors did As to want of light.

not give sufficient light, has been the principal charge against the process; but we are bound to state, that experiments, long continued, and of great variety, made, not only in the laboratory, but also in the public streets, have shown that the application of hydrocarbons to Gas will greatly increase its illuminating power. Some of the data for these conclusions are given in the Appendix (page 81). All this was well known before the experiment in Moorgate Street was tried,—it was, indeed, the main reason for its adoption; and, we must repeat, that the experiment was perfectly successful. Again, where meters are attached to the lamps, the brilliancy of the light is generally great; and our street observations, at page 38, show that the lamps furnished with carburettors have, since the Commission undertook the management of the process, given quite as good a light as those without the apparatus.

Conclusion
that the pro-
cess is practic-
able and eco-
nomical.

The result, therefore, which can be obtained at a single lamp, or at a dozen lamps, as in Moorgate Street, can also be obtained, by due attention, to the lamps of the whole City; and we are satisfied, from a careful consideration of the whole subject, that three

cubic feet of Gas may be made equal in photogenic power to five cubic feet by this process; and also, that with care in the supply of a proper naphtha, the economy of the process is considerable. (*Vide* Appendix, page 79.)

We have reason to believe, however, that, in numerous instances, this supply has not been afforded, and we have no doubt, that the difficulties of insuring the supply have been considerably increased by the antagonism of the Gas Companies. It is probable that this may be always expected, in the case of any proposed improvement, so long as the Gas Companies have the entire control of the public lighting; and nothing but the possession of this control by the Commission, and the burning of the Gas by meter, as in the case of an ordinary customer, will remove this difficulty.

Necessity for Commission having control of the public lamps.

The total quantity of Gas nominally consumed at the public lamps in the City, is shown in the Table in the Appendix. (Table II., page 96, Appendix.)

Total quantity of gas consumed annually in public lamps of City.

MEASURES TAKEN TO ASCERTAIN THE EXTENT AND REASON OF DEFECTIVE LIGHTING.

No supervision
until recent
years.

Until within the last few years, as we have said, there was no real supervision of the public lighting. The supply of Gas, and all that had reference to it, excepting the cleaning and painting of the lanterns, was left entirely to the good faith of the Companies.

Police report
defective lights
in 1860.

In 1860 the police first rendered assistance to the Commission, by reporting the defects of the public lamps; and, in the middle of 1861, when there were loud complaints of the defective state of the street lighting, the Commission obtained still further assistance from them, and the police reported all cases of very evident deficiency in the intensity of the light. The Companies received notice of these reports, and made their statements of the cause of the defects; but there the matter rested, for, up to that time, there were no officers appointed by the Commission to investigate the subject.

Investiga-
tions by special

But, in 1862, when the complaints became still louder, the Engineer was authorised to

employ a person for the special purpose of ^{agent of Commission, in 1862.} inquiring into the cause of the defective lights, and he commenced his duties about the middle of July in that year. All subsequent investigations have been mainly made by him, under our joint direction and supervision.

Later in the same year, the police were ^{Increased aid from police in 1862} requested to furnish to your Engineer, early every morning, an account of the defects observed by the constables on the preceding night; they were furnished with a list of the lamps having meters affixed to them, and were informed, that such lamps might be considered as standards by which the sufficiency of light given by the other lamps in the City might be judged of.

During a period of 52 days, at the end of ^{Number of Complaints during latter part of 1862.} 1862—133 complaints were made by the police of defective lighting, and, in all those cases, we caused an examination to be made of the fittings and carburetting apparatus. These examinations were mostly conducted after mid-day, the returns from the police being sent in at 10 A.M.; but we are unable to state whether, previously to the examination of the lamps by our assistants, the Companies had noticed the defects, and had done anything to remedy them.

General re-
sults of investi-
gation of
complaints.

Our investigations into the causes of the complaints gave the following results—

In 89 cases, no fault could be discovered in the carburettors or fittings.

In 12 cases, the apparatus was out of order, or wanting in a due supply of naphtha—in some cases water only was found in them. (They were then under the charge of the Carburating Company.)

In 26 cases, there were stoppages in the fittings.

Companies
give explana-
tion of cause
of defective
light.

At that time, it was not the custom of the Companies to furnish explanation of the cause of these defects; but, shortly afterwards, at the request of the Commission, they commenced to do so.

The stoppages in the fittings will account for the deficiency of light in 26 cases, but with regard to the remaining 101, no positive reasons can be alleged for the feebleness or extinction of the light; the latter was most probably due to the wind, acting on the reduced flames; but, whether this reduction of flame was owing to the carburetting apparatus, or to the small amount of Gas consumed at

the actual moment of extinction, is uncertain, for there is nothing in the structure of the carburetting apparatus which can interfere with the issue of the Gas, even if the quantity or quality of naphtha is deficient.

It should be noted, however, that there was not a single instance of complaint of extinction, or feebleness of light, from any lamp to which a meter was affixed. No complaints where meters were affixed.

From that time to the present, returns have been regularly made by the police, and they have been investigated by the agents of the Commission. The general results will be best seen by reference to the following Table, which shows the proportion of defect to the total number of lights:— System still continued. (1864).

Name of Company.	No. of lights in district.	Total defects per night, in		
		1861,	1862,	1863.
Chartered Compy.	1,112	0·09 or 1 in 11 nights.	0·14 or 1 in 7 nights.	0·29 or 1 in $3\frac{1}{2}$ nights.
Gt. Central „	1,772	0·82 or 1 in $1\frac{1}{5}$ nights.	1·76 or $1\frac{3}{4}$ in 1 night.	2·25 or $2\frac{1}{4}$ in 1 night.
Total..	2,884	0·91 or 1 in $1\frac{1}{10}$ nights.	1·90 or $1\frac{9}{10}$ in 1 night.	2·54 or $2\frac{1}{2}$ in 1 night.

There was, therefore, on the average, during 1863, a serious defect in about $2\frac{1}{2}$ lights nightly, out of 2,884 public lamps.

An inspector of public gas lighting needed.

The experience thus gained warrants us in saying, that, whatever system the Commission may be pleased to adopt in future, with regard to the public lighting, it appears to us that an Inspector, whose sole duty it should be to supervise the public lighting, should be appointed. The proper discharge of his duties would occupy the whole of his time, and would require him, frequently, to be out a large portion of the night: this, with the earnest co-operation of the police, might do much to maintain the public lighting in an efficient state.

Commission should light, cleanse, and repair, &c.

On a full consideration of all the circumstances discussed in the foregoing sections of the Report, we are still of opinion, that the only way of securing a proper supply of Gas to the public lamps, of avoiding the constant complaints of their defective state, and of preventing the ever-recurring differences between the Commission and the Companies, is for the Commission to take the entire charge of the lighting, so that they may consume the Gas by meter; and this would enable them to

adopt any improvement in burners, or other apparatus, which science and experience may dictate, and the responsibility of the success or failure of any new application would rest with the Commission alone.

ILLUMINATING POWER.

At the beginning of the year 1852, soon after the coming into operation of the Great Central Gas Consumers' Act, the Court of Common Council was requested to appoint an officer, in accordance with the provision of the Act, to test the illuminating power and chemical quality of the Gas supplied to the City. Your present Medical Officer was elected to that duty, and he has continued to perform it to the present time; for, when the Great Central Act was repealed by the Metropolis Gas Act of 1860, he was re-appointed to the office by the Commissioners of Sewers. There has, therefore, been an unbroken series of observations, by the same officer, from the beginning of the year 1852 to the present time; and, until very recently, those observations have been made with the same instruments, and in the same manner. It is true, that by the terms of the Great Central Act, the standard of comparison for measuring the illuminating

Officer appointed in 1852 to test Gas of Great Central Company.

Unbroken series of examinations, from 1852 to the present time.

Adoption of
sperm candle
in lieu of wax.

power of the Gas, was a wax candle, burning at the rate of 120 grains per hour; but from the very first moment that your officer was appointed, he perceived the difficulty and uncertainty of this mode of testing the illuminating power of Gas, and he determined to adopt a sperm candle as the practical standard of comparison. It was, however, necessary that the value of the Gas should be expressed in accordance with the terms of the Act of Parliament, and, therefore, after having made about 1,000 experiments on the comparative illuminating power of wax and sperm, it was ascertained, that, for equal consumptions, 16 wax candles are equal to 14 sperm; and this was the basis of all subsequent calculations.

Mode of test-
ing illuminat-
ing power in
1852.

Again, it should be stated, that at the time of your officer's appointment, in 1852, it was the custom to test the illuminating power of Gas, without using any contrivances for preventing the influence of diffused, and reflected light upon the disc of the photometer. This influence was so marked, that it caused an increase of at least 30 per cent. over the real illuminating power of the Gas. Measures were, therefore, at once taken to prevent this; and it may be remembered, that it was the subject of complaint to this Court by the Great Central Company, and that the Commissioners were

memorialised by the Chairman and Directors of the Company, to request the officer to make his experiments in accordance with the old method of investigation, as the results of the new method were so damaging to the value of the Gas, and, as it was thought, to the interests of the Company; fortunately, however, for the Company, the Commissioners refused to entertain the application. If they had not done so, the illuminating power of the Great Central Gas, as it was supplied in 1852, would have been recorded as equal to more than 18 sperm candles, instead of less than 14; and the comparison of the Gas in 1852, with that in 1864, would have been as 18·19 is to 13·74.

Commission memorialised to continue old method of testing.

Lastly, it must be mentioned that, since the month of February of this year, the Gas of all the Companies has been tested with a burner which raises the illuminating power about 12 per cent. over that of the old burner. The construction of the burner is strictly in accordance with the provisions of the Act of Parliament, and your officer has adopted it, after much consideration, because he has felt that, although the change from the old burner to the new is seemingly against the interest of the public, yet, if any question were to arise, in a court of law, concerning the defective power of the Gas, it would, undoubtedly, be

Gas of all these Companies tested since Feb. 1863, with improved burner.

said by the Companies, that justice had not been done to them in the manner of testing; for, as no burner can *produce* light, but merely *educe* it, they are entitled to all the light which can be evoked from the Gas by any burner which fulfils the conditions of the Act of Parliament. Therefore, the new burner has been adopted; and it differs from the old one merely in the circumstance that the diameter of the internal aperture is 0·44 inch, instead of 0·57 inch. The influence of the size of this aperture on the illuminating power of the common Gas of London, may be seen by the following Table:—

Photometrical Value of Different Burners.

Kind of Burner.	Diameter of internal hole. (inch).	Illuminating power in Sperm Candles. (120 grs.)	Per Cent. difference of illuminating power.
Old brass, 15 holes	0·70	11·30	100
Old ditto „ „ (Old Standard burner)	0·57	12·12	108
Steatite „ „	0·50	13·23	117
Ditto „ „ (New Standard burner)	0·44	13·56	120
Ditto „ „	0·43	13·00	115
Ditto „ „	0·42	12·50	110
Benghel, 30 holes (Paris Standard burner)	0·35	15·33	135

So that, in the experiments with common 12-candle Gas, the light evoked from it increases with the burner up to the one with a diameter of 0.44 inch, when it decreases. The cause of this is entirely due to the supply of air to the interior of the flame; for, when the hole is large, the current is so rapid, and the supply of air so great, that the Gas is over-burnt, much in the same way as when the wind blows on an exposed flame out of doors and renders it blue. If, however, the internal hole is too small, the current is so checked, that the Gas does not get sufficient air, and it smokes, and escapes unconsumed. There is a point, therefore, when the supply of air to the Gas is so apportioned as to be exactly sufficient to burn it without smoking, and to burn it also without over-oxidation. This point is reached, in the case of the common 12-candle London Gas, with a burner having an internal diameter of 0.44 inch (having also 15 holes, and a 7-inch chimney, and consuming 5 cubic feet of Gas per hour). In the case of the Benghel burner of 30 holes, which is the standard burner for Paris, it is not possible to consume 5 feet per hour, but only about $3\frac{1}{2}$ feet; and this burns so advantageously, in consequence of the small size of the internal aperture, that it raises the

Influence of
burner on
illuminating
power of gas.

illuminating power of the Gas 35 per cent. above that of the very old burners.

Comparative
values of the
new and old
burners.

With the view, therefore, of making the illuminating power of the Gas supplied to the City, before the passing of the Metropolis Gas Act of 1860, fairly comparable with that of the Gas supplied to it since that time, I have taken all the testings made in the City, and no where else, from the year 1852 to the present time ; and these testings have been estimated according to the values of both the new burner and the old. The following are the yearly results.

Comparative illuminating power of the Chartered and Great Central Gas before the passing of the Metropolis Gas Act of 1860, and since; estimated in Standard Sperm Candles of 120 grains.

Years ending in February.	Chartered Gas.		Great Central Gas.	
	Old Burner (0·57 inch.)	New Burner (0·44 inch.)	Old Burner (0·57 inch.)	New Burner (0·44 inch.)
1853	12·68	13·18	13·99	15·65
1854	12·67	14·14	13·13	14·69
1855	12·72	14·23	13·28	14·85
1856	12·48	13·95	13·34	14·92
1857	11·91	13·33	13·31	14·89
1858	11·19	12·52	12·91	14·44
1859	„	„	12·94	14·47
1860	„	„	12·87	14·39
1861	„	„	11·73	13·12
1862	12·12	13·56	11·84	13·25
1863	13·16	14·72	12·91	14·44
1864	12·88	14·41	13·74	15·37
1865	11·88	13·27	12·09	13·50
5 years (from 1852) }	12·49	13·97	13·41	15·00
10 years (from 1852) }	12·25	13·70	12·93	14·47
3 years (since 1862) }	12·64	14·13	12·91	14·44

Comparative
illuminating
power of the
Gas before
1861, and since

It will be seen, therefore, that during the time of active competition, namely, from 1852 to 1857, the average illuminating power of the Chartered Gas was 12·49 sperm candles (old measure), and that of the Great Central 13·41, whereas, in the three years which have elapsed since the passing of the new Act, and during which time the price of the Gas, without meter rent, has been 4s. 6d. per 1,000, instead of 4s., the average illuminating power of the Chartered Gas has been 12·64 candles (old measure), and that of the Great Central 12·91. In other words, while the price of Gas, in the last three years, has been raised $12\frac{1}{2}$ per cent. above the price of the former period, the illuminating power of it has, in the case of the Chartered Gas, been raised only about 1 per cent., and in that of the Great Central, it has actually fallen to the extent of nearly 4 per cent.

CHEMICAL PURITY.

Prior to the passing of the Metropolis Gas Act of 1860, the only provision for the purity of the Gas supplied to the City, was, "that it should be superior in purity to the Gas in common use, supplied at or about the 7th day

of December, 1849, by any of the Companies who then lighted the City of London, or any part thereof, with Gas ;” but, practically, it was found, during a period of ten years, that the Gas of the Great Central and Chartered Companies rarely contained a trace of sulphuretted hydrogen, and that the quantity of sulphur, in any shape, did not average more than twenty grains per 100 cubic feet. The following are the average proportions actually found in the Gas of the three Companies supplying the City of London, from 1853 to 1859 :—

Purity not estimated before 1849.

Purity of the Gas from 1853 to 1859.

Amount of Sulphur per 100 Cubic feet of Gas.

Great Central Company	16·4 grains.
Chartered Company.....	21·5 ,,
Commercial Company	17·1 ,,
Average.....	18·3 ,,

Acting on the information thus obtained, your Medical Officer stated, in his evidence before the Committee of the House of Commons, at the time when the inquiry into the Metropolis Gas Bill was taking place, that the maximum amount of sulphur in the Gas supplied to the Metropolis, should be 20 grains per 100 cubic feet. The evidence was accompanied with much information of the mischief done by the sulphur of burning Gas to all

Legislation as to purity.

Failure of the Companies to fulfil the conditions of the Act as to purity.

kinds of textile fabrics; and the effect of it was, that Parliament limited the amount of sulphur to the quantity named. But, although the proportion of sulphur in the Gas supplied to the City before the year 1859 did not, except in the case of the Chartered Gas, exceed 20 grains per 100 cubic feet, it has rarely happened since the passing of the Act, until very recently, that the amount has not been largely in excess of it; for example, out of 380 examinations made of the Gas of each of the Companies, during the last sixteen months, there have been 271 occasions when the Gas of the Great Central Company contained an excess of sulphur; 223, when that of the Chartered contained an excess; and 186, when it was so with the City Gas. Altogether, therefore, the violations of the law in this particular, have, in the case of the Great Central Gas, amounted to 71 per cent. of all the testings; in that of the Chartered, to 58 per cent.; and in that of the City Company, to 48. (*Vide* Appendix, page 116, for amounts of sulphur in Gas during the last twelve months.)

Lately, however, since this matter has been under the consideration of the Commissioners; and the Referee appointed by the Gas Companies to report on the subject, has

so unmistakably pointed to the way in which this impurity may be avoided, one of the Companies, namely, the City of London Company, has very notably diminished the amount of it; for, during the last quarter, there were but five occasions, out of sixty-five, in which the quantity of sulphur exceeded the proportion sanctioned by Parliament; and the average amount of sulphur in the Gas supplied by that Company, during the quarter, did not exceed 18·3 grains per 100 cubic feet.

Considering, therefore, all the facts before us, the conclusion is, that neither in illuminating power, nor in chemical quality, is the Gas of 1864 better than that of 1854; and this conclusion is not based upon observations made for the occasion, but upon the published results of the last thirteen years, most of which have been confirmed by other observers.

General conclusion as to illuminating power and chemical purity.

We have the honour to remain,

GENTLEMEN,

Your obedient Servants,

WILLIAM HAYWOOD,

HENRY LETHEBY.

APPENDIX.

APPENDIX.

REPORT

UPON THE

CARBURATION OF GAS,

AS SUPPLIED TO THE

PUBLIC GAS LAMPS,

BY THE PROCESS OF THE

UNITED KINGDOM CARBURATING GAS COMPANY.

TO THE HONOURABLE THE COMMISSIONERS OF
SEWERS OF THE CITY OF LONDON.

SEWERS' OFFICE, GUILDHALL,
30th July, 1861.

GENTLEMEN,

I beg to report, that in pursuance of the resolution of the Court, of the 23rd April last, I have directed an experiment, with the view of testing the value of the application to the public lamps, of the process patented by the United Kingdom Carburing Gas Company.

The patent of this Company is for placing near to the gas burners a receptacle containing coal naphtha, the Gas passing through or over this, takes up, and becomes enriched by the addition of, the volatile hydrocarbons contained in the naphtha, and the illuminating power of the Gas is thereby increased; the quality of the naphtha employed determines, mainly, the degree of illuminating power gained, and the chemical and photometrical experiments laid before me show that it varies from 25 per cent. to 77 per cent.

The experiment being one in which the Gas Companies are much interested, I applied to the Chartered Company, who light Moorgate Street, suggesting their co-operation in conducting it with me, the suggestion was at once acceded to, and their Inspector, Mr. Johnson, was placed in communication with me for that purpose.

Moorgate Street was selected as well adapted for the experiment, there being an equal number of lamps upon each side of the way, but one or two private lamps only in the street, and but few shops; the street is, therefore, after an early hour of the evening almost entirely without artificial light, excepting that which it derives from the public gas lights.

The patentees stating, that by the application of their process equal light would be given, with half the ordinary consumption of Gas, the burners were regulated accordingly.

The lamps experimented upon were twelve in number, six upon the western side, which were fitted with the ordinary batswing burners, calculated to consume upon the average of the night 5 cubic feet of gas per hour, and six upon the eastern side, fitted with batswing burners calculated to consume $2\frac{1}{2}$ cubic feet per hour. The latter burners having attached to them the carburetting apparatus of the Company, each of the twelve burners had a meter attached to it, to ascertain the actual consumption. No pressure regulators were fixed upon the lamps.

The registration commenced upon the 19th of June, and terminated upon the 19th of July inst., the experiment extending, therefore, over thirty nights, and gave the following results.

That the burners without the carburetting apparatus consumed about 4.39 cubic feet per hour.

That the burners fitted up with the carburetting apparatus consumed 2.09 cubic feet per hour.

No photometer was employed, the equalisation of the amount of light given by the two classes of burners was a matter of judgment. The District Inspector of the Commission, who saw the lights nightly, reports his opinion, that the light given was perfectly equal, and that his opinion is strengthened by collecting those of certain residents in the neighbourhood. My own opinion is, that the light of the 2½-feet burners was, upon the average of the month, inferior, although but very slightly so, to that of the 5-feet burners. The Inspector of the Chartered Company coincides with me in this.

No chemical analysis was made of the naphtha used; but it is stated by the patentees to have been of the best quality.

My deduction from the experiment is, that with naphtha of equal quality to that used, that, during the warm months of the year, 3 cubic feet of carburetted Gas may be considered as about equal to 5 cubic feet of Gas not carburetted.

Assuming this to be data applicable to all seasons of the year, I have estimated the saving to be effected by the process, and, after allowing for the cost of the apparatus, and for periodically filling it with naphtha, and after giving credit, at

the present price of the Gas supplied to the public lamps, for the quantity not consumed, it shows that the reduction in the cost of each public lamp will be at least £1 per annum; and, there being 2,825 lamps within the City, that a saving of about £2,825 would be annually effected.

The only disadvantage observed during the experiment was that the reservoir, as constructed, throws a disk of shadow round the base of the gas lamp standard, but the depth of shadow is but slight; this disadvantage may be largely rectified by an alteration in the form of apparatus.

It should be understood, that I do not pledge myself to any of these figures as exact, for the experiment, as conducted, cannot lay claim to be considered minute or exact in its character; but I believe it may, nevertheless, be taken as giving a close approximation to the truth; it is the mean of the rough results of practice, and the refined processes of the laboratory, from which reliable data are generally drawn; in this case, the results of the experiment are supported by laboratory experiments, and, consequently, there seems but little doubt, that this *mode* of applying naphtha to the public lights (for the naphthalisation of gas itself is by no means new) may lead to a considerable reduction in the cost of public lighting; but what

that reduction ultimately would be, would depend upon points which can only be determined by the application of the process to a considerable number of lamps for some length of time, and at different seasons.

I have the honour to remain,

GENTLEMEN,

Your most obedient Servant,

WILLIAM HAYWOOD,

Engineer.

RESULTS OF THE EXPERIMENTS ON THE CARBURATION OF COAL GAS.

The experiments made, during the last two years, on the carburation of Gas at the street lamps, have developed a number of facts that should be placed on record ; for these facts are not merely of scientific interest, they are also of practical value.

A common notion prevails, that the use of the carburettors in the public lamps has not been successful. I have, therefore, made it my business to ascertain whether this notion is founded in fact, and if so, whether the failure is due to an imperfection in the principle of the process, or to the manner in which it has been applied.

On the first of these heads, we have sufficiently expressed ourselves in the body of the Report ; and it is necessary only to say that, while, on the one hand, it cannot be denied that the use of the carburettors has not given public satisfaction, so, on the other, it must be admitted that, although the pro-

cess has not been fairly applied, its want of success is by no means so great as is generally supposed.

The principle involved in the process is, beyond all question, a correct principle, in so far as it relates in its application to the very inferior Gas of London ; but the success of the process is dependent on certain conditions which have not always been fulfilled. It has been ascertained, in fact, that the results of the process are affected by a great number of circumstances, many of which have been either disregarded, or have been placed beyond our control. These circumstances are, the quality of the naphtha, the time of the experiment, the temperature of the apparatus, the form of the carburettor, the quality of the Gas, and the rate at which it traverses the instrument. All these circumstances have received attention, and the following are the results of it:—

I.—AS REGARDS THE QUALITY OF THE NAPHTHA.

This has a very marked influence on the illuminating power of the naphthalised Gas. In point of fact, I have ascertained, by experiment, not only that the different naphthas of commerce furnish different proportions of vapour to the Gas, according to their different degrees of volatility, but, also,

that those vapours are endowed with very different degrees of photogenic power. A single grain, for instance, of some of the hydrocarbons to each cubic foot of common Gas will raise its illuminating power to the extent of only about 1·69 per cent.; whereas a grain of other hydrocarbons will raise it nearly 9 per cent. This is illustrated by the following Table, where only a few of very many experiments are recorded.

Table of the specific gravity, boiling point, volatility, and illuminating power of the various Naphthas used in a common street carburettor, with a batswing burner consuming 3 feet of Gas per hour.

Specific gravity water being 1000.	Boiling Point (Centigrade.) (deg.)	Amount per cent. yielded by distillation.		Average quantity taken up by each foot of gas. (grains.)	Per centage increase of illuminating power.	
		Up to 130° cent. (grains.)	From 130° to 150° cent. (grains.)		Total.	For each grain of Naphtha per cubic foot.
698	63	86	14	20·1	33·9	1·69
676	40	98	2	34·4	62·1	1·80
869	102	76	22	12·1	40·8	3·37
827	115	56	40	6·5	21·7	3·43
808	117	27	53	6·1	21·0	3·60
852	128	4	51	3·8	14·2	3·72
869	107	75	19	9·2	34·9	3·79
869	103	83	14	11·8	46·8	3·96
816	119	15	45	3·4	14·4	4·23
856	114	23	49	4·4	18·9	4·29
814	105	60	34	7·0	33·5	4·78
865	124	9	34	3·3	15·8	4·79
845	90	92	8	12·0	65·3	5·44
874	119	45	37	4·8	26·7	5·56
879	93	92	8	9·5	53·2	5·60
870	129	5	44	2·8	15·7	5·61
862	121	10	45	3·3	20·4	6·16
848	97	77	15	10·2	68·4	6·70
861	117	24	29	2·3	18·8	8·17
875	110	75	20	6·9	60·8	8·81

It would seem from this, that a naphtha with a low specific gravity, and a low boiling point, is not well suited for the carburation of Gas; for, although it yields a large quantity of vapour to the Gas, the photogenic value of it is but small. This is the kind of naphtha obtained from the petroleums and the shales of commerce, and it has, not unfrequently, been found in the naphthas supplied to the public lamps. On the other hand, the naphthas obtained from coal tar are much richer in carbon, and are, therefore, better suited for the carburation of Gas. But the more volatile of these naphthas are so largely used in the manufacture of red and purple dyes, that it is difficult to obtain them, at a reasonable price, for the street carburettors. I have, therefore, been compelled to specify a quality of naphtha which is not well fitted for the manufacture of dyes;—but this, also, is of rather low volatility, and is, therefore, not so good for the carburation of Gas as it ought to be. The terms of the specification are, “that the naphtha shall be colourless; of a specific gravity of about 870; of a boiling point not higher than 110° Centigrade (230° Fahr.); and yielding, on distillation, at least 70 per cent. of volatile naphtha, between the boiling point and 130° Cent. (266° Fahr.); and 20 per cent. between 130° and 150° Cent. (266° and 300° Fahr.).” This naphtha (the last in the table) furnishes about 7 grains of hydrocarbon vapour to each cubic foot

of Gas, at ordinary temperatures, and it raises the illuminating power of the Gas about 60 per cent. —in other words, it increases the light of a three-foot batswing burner from about 7 candles to 11, and thus makes 3 feet of Gas of the same value as 4·8. If it were possible to obtain, at a reasonable price, a coal naphtha of a little higher volatility at ordinary temperatures—as, for example, a naphtha yielding about 10 grains of hydrocarbon to each cubic foot of Gas,—the illuminating power of the Gas would be increased about 68 per cent. A gallon of this naphtha will weigh nearly 60,000 grains, and it would be sufficient to naphthalise 6,000 cubic feet of Gas—making them equal to about 10,000 feet of unnaphthalised Gas. Such a naphtha, even at 6s. per gallon, would be equal to just three times its money worth of Gas; for a gallon of the naphtha, costing 6s., would give the light of 4,000 cubic feet of Gas, costing 18s. The only difficulty, at present, in the realisation of this object is, in the uncertain composition of the naphthas of commerce; but this difficulty would soon be overcome if a steady demand for such a naphtha existed. Even as it is, it may be said that the common coal naphthas of commerce increase the illuminating power of the London Gas to the extent of about 4·5 per cent. for every grain of naphtha taken up by a cubic foot of Gas.

These naphthas are obtained at a maximum price of 4s. per gallon, and a gallon will double the illuminating power of rather more than 2,600 cubic feet of Gas: in other words, we have 4s. worth of naphtha doing the work of about 12s. worth of Gas. These are the unquestionable results, not merely of laboratory investigations, but also of carefully conducted experiments at the public lamps in Moorgate-street.

II.—AS REGARDS THE TIME, OR DURATION, OF THE EXPERIMENT.

As all the naphthas of commerce are mixtures of various hydrocarbons of different degrees of volatility, it happens that the most volatile constituents of the naphthas are given up, very freely, to the Gas at the commencement of the experiment, and the less volatile, with more difficulty, at the end. In consequence of this, there is always a large increase of illuminating power when the carburettor is first charged with naphtha, and a marked diminution of it at last. This irregularity has not, hitherto, been compensated for by a regulated supply of Gas; and, therefore, it has happened, that when a naphtha yielding, at first, as much as twenty-three grains of hydrocarbon per cubic foot of Gas has been used,

the illuminating power has been doubled; but, after a time, from the diminished volatility of the naphtha, the power has gradually fallen to less than 25 per cent. Numerous experiments have been made, to determine the influence of this circumstance on the value of the process, and the following Table is given in illustration of it.

*Table showing the differences in the volatility of the Naphtha, and the illuminating power of the Gas, at different periods of the experiments.**

Quantity of gas passed. (cubic feet.)	Quantity of naphthataken up per foot of gas. (grains.)	Illuminating power, in standard sperm candles.		
		Not carbu- retted.	Carburetted.	Increase per cent.
80	23.2	6.78	13.68	101.7
152	21.6	7.42	14.30	92.8
136	17.6	7.45	13.24	75.1
232	15.6	7.25	12.10	67.0
198	11.6	6.80	10.19	50.0
249	11.5	7.04	10.44	48.3
285	11.5	7.17	10.81	50.1
330	7.4	7.62	10.04	31.8
451	7.3	7.18	9.60	33.7
2113	12.1	7.21	11.60	60.1

* This experiment was made with a street carburettor of the form designed by me, and with 26,000 grains, or nearly 4 pints, of common naphtha, having a density of 869°, and a boiling point of 103° C., and yielding 82.7 per cent. of distilled product from its boiling point to 130° C., and 14.3 per cent. from 130° to 150° C. The experiment was continued for 30 days and nights, and the Gas was continually burning from a three-foot batwing burner, — the temperature of the room being 22° C. (72° F.)

III.—THE INFLUENCE OF TEMPERATURE ON THE CARBURATION OF THE GAS.

In warm weather the volatility of the naphtha is increased, and, therefore, a larger amount of hydrocarbon vapour is given to the Gas. A few experiments have been made, at different times of the year, on the street carburettors, with the view of ascertaining the extent of this influence within common ranges of temperature. The following are the results:—

Table showing the volatility of the Naphtha, and per centage amounts of increase of illuminating power, according to temperature, at different seasons of the year.

SEASON.	Temperature. Fahrenheit.	Quantity of naphtha per cubic foot of gas (grains).	Per centage increase of illuminating power.
Spring	41°	5.25	23.6
Summer	72°	12.09	54.4
Autumn	62°	10.77	48.5
Winter	37°	4.94	22.2

These results show, that it is of great importance to keep the carburettors at as uniform a temperature as possible; and it is with this view that the Carburetting Company have placed the apparatus

within the lamps, thinking that, in such a situation, a common and uniform temperature of about 60° would be maintained. There is, however, a better situation at the top of the lamp, where the temperature, at the time of carburation, would be very uniform at all seasons of the year, and where the apparatus would be entirely out of sight.

IV.—AS REGARDS THE FORM OF THE APPARATUS.

Experiment has proved, that the form of the apparatus has a very marked influence on the carburation of the Gas; for when the instrument is so constructed that the Gas merely passes into the chamber containing the naphtha, without sweeping over the surface of the liquid, a very small proportion of the volatile hydrocarbon is taken up. On the contrary, when the Gas is brought into contact with a large surface of naphtha, it becomes highly charged with the vapour, and acquires a high illuminating power. In the course of the experiments, which have been made for the purpose of estimating the value of this influence, 4 kinds of carburettors have been used, namely:—

1. A simple chamber, containing naphtha, with an inlet and exit pipe for the Gas at the apex of the apparatus.

2. The carburettor supplied by the Carburing Company, which is contrived to make the Gas flow once over the surface of naphtha before it leaves the chamber.

3. A carburettor contrived by me, which has a series of septa for making the Gas pass many times over the naphtha before it leaves the apparatus.

4. A carburettor of M. Mongrue, and also one of M. Nordhoff, both of which contain septa of cotton threads, saturated with naphtha, through which the Gas must pass, and so become highly charged with vapour before it leaves the chamber.

In operating with each of these carburettors, under the same circumstances, and with the same naphtha,—namely, that supplied according to the contract, it was found, that while the first form of apparatus gave only 3·2 grains of naphtha per cubic foot of Gas, the second gave 6·0 grains, the third 12·1 grains, and the fourth from 22 to 23 grains. It is manifest, therefore, that, to secure a uniform supply of hydrocarbon vapour, it is necessary to bring the Gas into contact with a large surface of naphtha.

V.— THE QUALITY OF THE GAS AFFECTS THE CARBURATION.

When Gas is already charged with a large proportion of the richer hydrocarbons, it manifests no disposition to take up the vapour of naphtha—on the contrary, if it be a Cannel Gas of very high illuminating power, the naphtha will deprive it, to a certain extent, of its hydrocarbons, and so render it weaker,—the process, therefore, is only applicable to such a poor Gas as that which is supplied to the City; and, even in the case of this Gas, it has been noticed, that when a dose of naphtha has been already given to it, it does not show the same tendency to absorb the vapour as it did before. And here it is proper to remark, that the deficiency of light from the carburettors might have been due to the circumstance, that the Gas supplied to them was often already charged with the vapour of naphtha, derived from the naphtha which the Company had poured into the main pipes, for the purpose of dissolving the naphthaline that had been deposited in them. If, therefore, a very poor Gas, already charged with naphtha vapour, be brought to the street carburettors, it will not absorb a much larger proportion of naphtha, and will not, therefore, have its illuminating power much increased. This is one of the uncontrollable difficulties with which we have had to contend.

VI.—THE CARBURATION OF THE GAS IS
AFFECTED BY THE RATE AT WHICH
IT TRAVERSES THE APPARATUS.

This might be easily perceived, from the circumstance that the longer and more completely the Gas is brought into contact with the naphtha, the more fully it becomes charged with its vapour. Experiment has shown that, when in the same carburettor the Gas is burnt at the rate of 3 feet per hour, and the light is increased to the extent of 41 per cent., it will be only increased to 34 per cent. if it is burnt at the rate of $3\frac{1}{2}$ feet per hour; but this difficulty is easily overcome by increasing the surface of naphtha.

In conclusion, therefore, it may be said, that although the success of the carburetting process is evidently dependent on many conditions, yet, as all these conditions are under control, there is no reason that they should not be at all times fulfilled, and the success of the process secured. One thing, it will be observed, is beyond all question, and that is, that every grain of common coal naphtha given to a cubic foot of Gas increases its illuminating power about 4·5 per cent. (a good naphtha will increase it about 8 per cent.); and this grain of naphtha costs only about one-third of its equivalent in London Gas.

HY. LETHEBY.

PLAN OF CITY OF LONDON SHEWING DISTRICTS OF GAS SUPPLY.

REFERENCE.

- A. District of Chartered Gas Company.
- B. District of City of London Gas Company.
- A & B. Great Central Gas Company's District comprising the whole of the City.



WILLIAM HAYWOOD.
Engineer & Surveyor to the
Commissioners of Sewers of the City of London.

1864.

TABLE I.—Table showing the prices charged, per 1,000 cubic feet, for Gas for private consumption, by the Companies supplying the City of London, and the prices paid by the Commissioners of City Sewers for Lighting the Public Lamps, from 1823 to 1864 inclusive.

NAME OF COMPANY CONTRACTING WITH THE COMMISSION FOR THE PUBLIC LIGHTS.											REMARKS.			
City of London Gas Company.				Chartered Gas Company.				Great Central Gas Company.						
Price per 1,000 cubic feet supplied by meter to inhabitants.		Batswing burner, estimated consumption 5 cubic feet per hour—price per annum including lighting, extinguishing, and repairing.		Price per 1,000 cubic feet supplied by meter to inhabitants.		Batswing burner, estimated consumption 5 cubic feet per hour—price per annum including lighting, extinguishing, and repairing.		Price per 1,000 cubic feet supplied by meter to inhabitants.		Batswing burner, estimated consumption 5 cubic feet per hour—price per annum including lighting, extinguishing, and repairing.				
s.	d.	s.	d.	£	s.	d.	s.	d.	£	s.	d.	£	s.	d.
1823		15	0	5	5	0	15	0	5	5	0			
1824		15	0	5	5	0	15	0	5	5	0			
1825		15	0	5	5	0	15	0	5	5	0			
1826		15	0	5	5	0	15	0	5	5	0			
1827		15	0	4	14	6	15	0	4	14	6			
1828		13	6	4	14	6	13	6	4	14	6			
1829		13	6	4	14	6	13	6	4	14	6			
1830		13	6	4	14	6	13	6	4	14	6			
1831		12	6	4	14	6	12	6	4	14	6			
1832		12	6	4	10	0	12	6	4	10	0			
1833		10	0	4	10	0	11	3	4	10	0			
1834		10	0	4	10	0	10	0	4	10	0			
1835		10	0	4	10	0	10	0	4	10	0			
1836	10	0	&	9	0	0	10	0	&	9	0	0		
1837		9	0	4	10	0	9	0	4	10	0			
1838		9	0	4	10	0	9	0	4	10	0			
1839		9	0	4	10	0	9	0	4	10	0			
1840		9	0	4	10	0	9	0	4	10	0			

TABLE II.—Table showing the nominal Annual Consumption of Gas at the Public Lamps in the City of London in 1863.

Company supplying lamps in 1863.	Description of burner.	Nominal consumption per burner, per hour, in cubic feet.	Number of burners.	Nominal consumption of Gas in cubic feet at the 2,884 public lamps.		
				Per hour.	Per night of 11 hours.	Per annum of 365 nights.
Chartered	Batswing	5	1,112	5,560	61,160	22,323,400
Great Central.....	Batswing.....	3	1,772	5,316	58,476	21,343,740
	Total .....	....	2,884	10,876	119,636	43,667,140*

* With 5-feet burners to the whole of the lamps, the nominal annual consumption is 57,896,300 cubic feet; the employment of the carburetting process in one district of the City, therefore, reduces the consumption of Gas annually by 14,229,160 cubic feet.

Public Lamps upon Pillars.....	800
Ditto upon Brackets.....	2,084
	2,884

LAMPS WITH METERS.—CHARTERED GAS COMPANY.

TABLE IV.—Abstract showing the quantities of Gas consumed at some of the Public Lamps, WITH Carburettors, within the City of London, from 21st to 28th November, 1864. Total number of hours burning $110\frac{1}{2}$. Contract quantity 3 cubic feet per hour.

SITUATION.	No. of lights on meter.	Meters where fixed.	Registration of gas per meter, in cubic feet.	Consumption of gas per light, in cubic feet.	Average consumption per light, per hour.	REMARKS.
Moorgate Street, opposite No. 5	1	In base of column.	380	380	3.44	Above contract quantity.
" " " 10	1	" "	300	300	2.72	Below "
" " " 14	1	" "	306	306	2.77	" "
" " " 22	1	" "	424	424	3.83	Above "
" " " 29	1	" "	364	364	3.29	" "
" " " 35	1	" "	271	271	2.45	Below " (lowest.)
Opposite Mansion House	5	" "	2000	400	3.62	Above "
" Princes Street	5	" "	2040	408	3.69	" "
" Royal Exchange	5	" "	2123	425	3.84	" " (highest.)
Total.....	21	9 meters.	8208			

Lights. Hours.
 $8208 \div 2320.5 (21 \times 110.5) = 3.54$ or $3\frac{1}{2}$ cubic feet, the average consumption per burner, per hour.
 NOTE.—6 lamps registered above the quantity, 3 registered below the quantity.

TABLE V.—Abstract showing the quantities of Gas consumed at some of the Public Lamps, WITHOUT Carburettors, within the City of London, from 21st to 28th November, 1864. Total number of hours burning $110\frac{1}{2}$. Contract quantity 5 cubic feet per hour.

SITUATION.	No. of lights on meter.	Meters where fixed.	Registra- tion of gas per meter, in cubic feet.	Consump- tion of gas per light, in cubic feet.	Average consump- tion per light, per hour.	REMARKS.
Bank Buildings, opposite No. 5.....	1	On column.	518	518	4.68	Below contract quantity.
Lothbury, urinal.....	3	In ground.	1604	535	4.84	" "
Leadenhall Street, opposite No. 95.....	1	On column.	630	630	5.70	Above "
Milk Street and Gresham Street, corner of..	1	"	716	716	6.48	" (highest.)
Moorgate Street, opposite No. 35A.....	1	"	647	647	5.85	" "
" " " 41.....	1	"	376	376	3.40	Below " (lowest.)
" " " 47.....	1	"	686	686	6.20	Above "
Old Broad Street " " 71.....	1	In base of column.	447	447	4.00	Below "
St. Martin's Church, Bishopsgate.....	1	On column.	529	529	4.78	" "
Total.....	11	9 meters.	6153			

Lights. Hours.

$6153 \div 1215.5 (11 \times 10\frac{1}{2}) = 5.06$ feet, the average consumption per burner, per hour.
NOTE.—4 lamps registered above the quantity, 5 registered below the quantity.

TABLE VI.—Table showing the situations of the Public Lamps in the City of London to which Meters are fixed, (December 1864.)

SITUATION.	No. of meters.	Meters where fixed.	No. of lights measured by meter.	Date of fixing meter.	Maker of meter.	REMARKS.
Bank Buildings, opposite No. 5	1	Upon column.	1	September 2nd, 1862	Croll & Co.	
Cannon Street. " " 71	1	In ground.	1	September 23rd, 1862	"	
" " by King William Street	1	In base of col.	5	February 5th, 1864	G. Glover.	
Cheapside, opposite No. 1	1	"	1	July 20th, 1863	Croll & Co.	
Crutched Friars, urinal	1	In ground.	2	September 16th, 1864	"	
Fleet Street, opposite No. 86	1	In base of col.	1	October 11th, 1864	"	
" " " 104	1	"	1	October 11th, 1864	"	
" " " 180	1	"	1	July 20th, 1863	"	
Gracechurch Street, by Eastcheap	1	"	5	June 6th, 1864	G. Glover.	
Gresham Street, by Milk Street	1	Upon column.	1	September 3rd, 1862	Croll & Co.	
Holborn, urinal	1	In ground.	3	October 22nd, 1862	"	
King William Street, opposite No. 20	1	"	1	September 23rd, 1862	"	
" " " 79	1	In base of col.	1	July 20th, 1863	"	
Leadenhall Street, " " 26	1	"	1	July 20th, 1863	"	
" " " 95	1	Upon column.	1	September 5th, 1862	"	
Lothbury, urinal	1	In ground.	3	October 21st, 1862	"	
Lower Thames Street, attached to No. 57 ..	1	Upon bracket.	1	September 15th, 1862	Meacock.	
				September 25th, 1862	Croll & Co.	

Mansion House Place, urinal.....	1	In base of col.	1	May 26th, 1863	"
Moorgate Street, opposite No. 5	1	"	1	"	"
" " " 10	1	"	1	"	"
" " " 14	1	"	1	"	"
" " " 22	1	"	1	"	"
" " " 29	1	"	1	"	"
" " " 35	1	"	1	"	"
" " " 35A.....	1	Upon column.	1	"	Meacock.
" " " 41	1	"	1	"	"
" " " 47	1	"	1	"	"
Mansion House, opposite	1	In base of col.	5	November 18th, 1863	G. Glover.
Mark Lane, " No. 69	1	Upon bracket.	1	October 1st, 1862	Croll & Co.
Mincing Lane " 11	1	In ground.	1	September 25th, 1862	"
Newgate Street " 90	1	In base of col.	1	July 20th, 1863	"
Old Broad Street " 71	1	"	1	September 5th, 1862	"
Princes Street, opposite	1	"	5	November 18th, 1863	G. Glover.
Royal Exchange "	1	"	5	October 13th, 1864	Croll & Co.
Skin Market.....	1	In ground.	1	September 26th, 1862	"
St. Andrew's Hill, attached to No. 12	1	Upon bracket.	1	September 18th, 1862	Meacock.
St. Martin's Church, Bishopsgate	1	Upon column.	1	September 5th, 1862	Croll & Co.
St. Paul's Churchyard, east side of vaults ..	1	In base of col.	1	August 20th, 1864	"
Total.....	39		66		

LAMPS WITHOUT METERS.—GREAT CENTRAL GAS COMPANY.

TABLE VII.—Table showing the quantity of Gas consumed at some of the Public Lamps, WITH Carburettors fixed in the base of columns, from Oct. 10th to Oct. 18th, 1864, between the hours of 8 p.m. and 1 a.m.

SITUATION.		Consumption of gas, cubic feet per hour.	Condition of tap.	REMARKS.
ST. PAUL'S CHURCHYARD.				
Opposite No. 30A	.....	3·2	Full on.	
„ „ 31	.....	3·2	„	
„ „ 32	.....	2·5	„	
„ „ 33	.....	3·0	„	
„ „ 34	.....	2·6	„	
1 east of the vaults	.....	3·0	„	A meter is attached [to this lamp.
1 south of „	.....	1·3	„	
Opposite No. 27	.....	3·5	„	
„ „ 26	.....	1·4	„	
„ „ 20	.....	3·0	„	
„ „ 17	.....	3·5	„	
„ „ 9	.....	3·2	„	
„ „ 2	.....	3·1	„	
„ „ 79	.....	3·0	„	
„ „ 74	.....	4·1	„	A steatite burner.
„ „ 72	.....	4·0	„	„ „
„ „ 69	.....	4·1	„	„ „
„ „ 68	.....	2·2	„	
„ „ 60	.....	4·0	„	A steatite burner.
„ „ 54	.....	4·1	„	„ „
„ „ 50	.....	3·0	„	
„ „ 48	.....	3·1	„	
„ „ 43	.....	2·3	„	
„ „ 42	.....	0·7	„	
„ „ 35	.....	3·0	„	
„ „ 35	.....	3·1	„	
Average of 26 lamps		2·97 per hour.		
LUDGATE STREET.				
Opposite No. 16	.....	3·0	Full on.	
„ „ 15	.....	3·3	„	
„ „ 10	.....	2·5	„	
„ „ 1	.....	2·1	„	
„ „ 40	.....	2·0	„	
„ „ 32	.....	1·2	„	
„ „ 21	.....	2·1	„	
Average of 7 lamps		2·31 per hour.		
LUDGATE HILL.				
Opposite No. 19	.....	2·2	Full on.	
„ „ 12	.....	1·8	„	
„ „ 48	.....	3·0	„	
„ „ 39	.....	2·5	„	
„ „ 33	.....	2·1	„	
„ „ 25	.....	2·3	„	
Average of 6 lamps		2·31 per hour.		

The contract quantity to these lamps is 3 cubic feet per hour.

LAMPS WITHOUT METERS.—GREAT CENTRAL GAS COMPANY.

TABLE VII. (continued).—Table showing the quantity of Gas consumed at some of the Public Lamps, WITH Carburettors, fixed in the base of columns, from October 10th to October 18th, 1864, between the hours of 8 p.m. and 1 a.m.

SITUATION.	Consumption of gas, cubic feet per hour.	Condition of tap.	REMARKS.
FLEET STREET.			
Opposite No. 104.....	2.4	Full on.	(A meter is attached to this lamp. The pipes were found to be stopped up.
„ „ 99.....	2.5	Partly off.	
„ „ 93.....	2.5	„	A meter is attached [to this lamp.
„ „ 86.....	5.1	„	
„ „ 85.....	2.5	„	
„ „ 81.....	2.5	„	
„ „ 72.....	3.0	„	
„ „ 67.....	2.5	„	
„ „ 62.....	2.5	„	
„ „ 54.....	2.0	„	
„ „ 47.....	3.5	Full on.	
„ „ 42.....	3.1	„	
„ „ 31.....	2.9	„	A meter is attached [to this lamp.
„ „ 19.....	2.8	„	
„ „ 7.....	3.0	„	
„ „ 204.....	3.1	„	
„ „ 193.....	2.3	Partly off.	
„ Clifford's Inn Passage.....	3.0	Full on.	
„ Hoarding at corner of ditto.....	3.0	„	
„ No. 186.....	1.5	„	
„ „ 180.....	3.0	„	
„ „ 169.....	1.5	„	
„ „ 161.....	1.6	Partly off.	A meter is attached [to this lamp.
„ „ 151.....	2.0	„	
„ „ 146.....	2.0	„	
„ „ 135.....	2.1	„	
„ „ 127.....	2.5	„	
„ „ 115.....	1.5	„	
„ „ 109.....	2.1	„	
„ „ 105.....	2.0	Full on.	
Average of 30 lamps.....	2.53 per hour.		

The contract quantity to these lamps is 3 cubic feet per hour.

Average of the 69 lamps in St. Paul's Churchyard, Ludgate Street, Ludgate Hill, and Fleet Street, is 2.65 cubic feet per hour.

LAMPS WITHOUT METERS.—GREAT CENTRAL GAS COMPANY.

TABLE VIII.—*Table showing the quantity of Gas consumed at some of the Public Lamps, WITH Carburetors fixed within the Lanterns, on December 12–13th, 1864, between the hours of 11·30 p.m. and 3·0 a.m.*

SITUATION.		Consumption of gas, cubic feet per hour.	Condition of tap.	REMARKS.
CANNON STREET.				
Opposite	No. 57	2·7	Full on.	
"	" 39	3·1	"	
"	" 28	2·6	"	
"	" 62	2·5	"	
"	" 25	3·0	"	
"	" 71	3·4	"	
"	" 78	2·7	"	
"	" 14	2·5	"	
"	" 8	2·6	"	
"	" 92	2·7	"	
"	" 1	3·0	"	
Average of 11 burners....		2·80		

The contract quantity to these lamps is 3 cubic feet per hour.

LAMPS WITHOUT METERS.—CHARTERED GAS COMPANY.

TABLE IX.—Table showing the quantity of Gas consumed at some of the Public Lamps, WITHOUT Carburettors, from Dec. 4th to Dec. 11th, 1864, from 7.30 p.m. to 2 a.m.

SITUATION.	Consumption of gas, cubic feet per hour.	Condition of Tap.	REMARKS.
BASINGHALL STREET.			
Attached to No. 48	5.1	Full on.	
" " 58	4.8	"	
" " 38	5.1	"	
" " 66	4.6	"	
" " 32	4.6	"	
" " 72	4.4	"	
" " 77	4.6	"	
" " 3	4.3	"	
" over Mason's Avenue	4.2	"	
" to the Church railings.....	4.8	"	
Opposite No. 11	4.6	"	
Corner of London Wall	5.4	"	
Average of 12 lamps....	4.70 per hour.		
ALDRSGATE STREET.			
Opposite No. 111.....	5.7	Full on.	
Aldersgate Street Buildings	5.6	"	
" No. 124.....	5.1	"	
" " 85.....	5.7	"	
" Hoarding	5.2	"	
" No. 117.....	4.8	"	
" " 68.....	5.3	"	
" " 127.....	5.1	"	
" " 53.....	4.8	"	
" " 139.....	4.4	"	
" " 45.....	4.6	"	
" Edmund's Place	4.8	"	
" No. 149.....	5.1	"	
" " 34.....	4.6	"	
" Westmorland Buildings	4.8	"	
" No. 27.....	4.6	"	
" " 164.....	4.5	"	
" " 18.....	4.7	"	
" " 174.....	4.7	"	
" " 10.....	5.0	"	
Average of 20 lamps....	4.95 per hour.		
RED CROSS STREET.			
Opposite No. 7	5.1	Full on.	
" " 16	4.5	"	
" " 23	4.4	"	
" " 58	4.8	"	
Attached to Hoarding.....	4.6	"	
" No. 30	5.1	"	
" " 1	4.8	"	
Average of 7 lamps....	4.75 per hour.		

The contract quantity to these lamps is 5 cubic feet per hour.

LAMPS WITHOUT METERS.—CHARTERED GAS COMPANY.

TABLE IX. (continued)—*Table showing the quantity of Gas consumed at some of the Public Lamps, WITHOUT Carburettors, from December 4th to December 11th, 1864, from 7.30 p.m. to 2 a.m.*

SITUATION.	Consumption of gas, cubic feet per hour.	Condition of tap.	REMARKS.
GRESHAM STREET AND GRESHAM STREET WEST.			
Attached to No. 19.....	4.5	Partly off.	
" " 34.....	4.1	"	
" " 25.....	4.0	Full on.	
" " 38.....	4.0	"	
" Swan with Two Necks	4.8	"	
Opposite No. 30	4.0	"	
" " 15	3.5	Partly off.	
" " 47	5.5	Full on.	
" Pickford's.....	4.2	"	
" No. 14	4.8	"	
" " 13	5.1	"	
Corner of King Street and Gresham Street..	5.5	"	
" Lawrence Lane and ditto ..	5.4	"	
" Wood Street and Gresham Street West	4.0	"	
" Gutter Lane and ditto ..	5.0	"	
Attached to railings of St. Ann's Churchyard	4.5	"	
Average of 16 lamps...	4.55 per hour.		
TOKENHOUSE YARD.			
Attached to No. 9.....	4.2	Full on.	
" " 7.....	3.7	"	
" " 25..	2.8	"	
" Tokenhouse Chambers	4.0	"	
Average of 4 burners....	3.67 per hour.		
AUSTIN FRIARS.			
Attached to No. 1.....	3.3	Full on.	
" " 29.....	3.2	"	
" Dutch Church	3.0	"	
Opposite "	4.0	"	
" Austin Friars Passage	4.5	"	
Average of 5 lamps	3.60 per hour.		
GREAT WINCHESTER STREET.			
Attached to No. 2.....	4.5	Full on.	
" " 33.....	4.0	"	
" " 3	3.5	"	
" " 28.....	3.0	"	
" " 15.....	3.1	"	
Average of 5 lamps....	3.62 per hour.		

LAMPS WITHOUT METERS.—CHARTERED GAS COMPANY.

TABLE IX. (continued)—Table showing the quantity of Gas consumed at some of the Public Lamps, WITHOUT Carburettors, from December 4th to December 11th, 1864, from 7.30 p.m. to 2 a.m.

SITUATION.	Consumption of gas, cubic feet per hour.	Condition of tap.	REMARKS.
OLD BROAD STREET.			
Opposite Imperial Fire Office.....	4.3	Full on.	
Attached to No. 8.....	4.5	"	
Opposite " 71.....	4.6	"	
Attached to " 12.....	4.1	"	
" " 69.....	3.8	"	
Opposite " 17.....	4.0	"	
Attached to " 62.....	5.0	"	
Opposite " 25.....	5.1	"	
Attached to " 56.....	4.8	"	
Opposite " 26.....	5.2	"	
Attached to " 54.....	4.7	"	
" " 39.....	4.1	"	
Average of 12 burners....	4.51 per hour.		
NEW BROAD STREET.			
Opposite No. 38.....	5.0	Full on.	
Attached to " 4.....	4.5	"	
" " 9.....	4.8	"	
Opposite " 37.....	4.2	"	
Average of 4 burners....	4.62 per hour.		
HOUNDSDITCH.			
Attached to No. 75.....	4.6	Full on.	
" " 87.....	4.4	"	
" " 65.....	3.8	"	
" " 98.....	3.7	"	
" " 54.....	4.1	"	
" " 115.....	4.2	"	
Opposite " 46.....	5.1	"	
Attached to " 127.....	4.4	"	
" " 37.....	4.5	"	
" " 138.....	4.7	"	
" " 26.....	4.2	"	
" " 148.....	3.8	"	
" " 17.....	4.6	"	
" " 157.....	4.4	"	
" " 5.....	3.6	"	
Average of 15 burners....	4.27 per hour.		

The contract quantity to these lamps is 5 cubic feet per hour.

Average of the whole 4.49 cubic feet per hour.

TABLE X.—Tenders for supplying and maintaining Gas Meters to the Public Lamps, within the City of London, (received by the Commission 9th December, 1862.)

Name of Maker.	Supplying, maintaining, &c., for 3 years, 6s. to be paid within 3 months, remainder in equal payments over 3 years.				Supplying, maintaining, &c., for 7 years, 6s. to be paid within 3 months, remainder in equal payments over 7 years.				Supplying, maintaining, &c., for 3 years, payment within 3 months, except 3s., which will be paid at expiration of 3 years.				For the use of meters for 7 years.		REMARKS.
	Per meter.				Per meter.				Per meter.				Per meter, per annum.		
	If fixed under ladder-irons.	If fixed upon brackets.	If fixed under ladder-irons.	If fixed upon brackets.	If fixed under ladder-irons.	If fixed upon brackets.	If fixed under ladder-irons.	If fixed upon brackets.	If fixed under ladder-irons.	If fixed upon brackets.	If fixed under ladder-irons.	If fixed upon brackets.			
Croll, Rait, & Co.	s. d. 29 9	s. d. 29 9	s. d. 36 3	s. d. 36 3	s. d. 26 6	s. d. 26 6	s. d. 4 0	s. d. 4 0	s. d. nil.	s. d. 4 0	s. d. nil.				
Meacock	27 9	27 9	32 6	32 6	25 6	25 6						nil.			

TABLE XI.—*Tenders for Lighting, Extinguishing, Cleansing, Repairing, Maintaining the Lamps, and Carburetting the Gas to Public Lamps, in the Southern District of the City of London, for 1 Year, from the 1st February, 1863, to 1st February, 1864.*

NAMES OF PARTIES TENDERING.	Per Lamp, per annum.	REMARKS.
	£. s. d.	
Messrs. S. T. & S. Gunn	1 7 6	
Z. D. Berry	1 4 9	
A. Chappell	1 1 0	
T. Sheen	1 2 6	

TABLE XII.—PUBLIC LAMPS.—REGISTER OF PRESSURES OF GAS.

Date 1862.	Time.	SITUATION.	PRESSURE.								Gas Company supplying Lamps.
			Lamps.		With Carburettors.		Without Carburettors.		Outlet.		
			With Meter.	Without Meter.	Inlet.	Outlet.	Inlet.	Outlet.			
Oct. 8	11 P.M.	} No. 31, St. Paul's Church- yard.	..	Yes.	11-tenths.	11-tenths.	..	..	} Great Central.		
" 8	12 "		..	"	10 "	10 "	..	..			
" 9	1 A.M.		..	"	10 "	10 "	..	..			
" 9	2 "		..	"	10 "	10 "	..	..			
" 9	3 "		..	"	10 "	10 "	..	..			
" 9	4 "		..	"	11 "	11 "	..	..			
" 9	5 "	..	"	"	12 "	12 "	..	..			
Oct. 8	11.15 A.M.	} No. 26, St. Martin's-le- Grand.	..	Yes.	10-tenths	10-tenths.	..	..	} Great Central.		
" 8	12.15 "		..	"	9 "	9 "	..	..			
" 9	1.15 "		..	"	9 "	9 "	..	..			
" 9	2.15 "		..	"	11 "	11 "	..	..			
" 9	3.15 "		..	"	11 "	11 "	..	..			
" 9	4.15 "		..	"	12 "	12 "	..	..			
" 9	5.15 "	..	"	"	12 "	12 "	..	..			
Oct. 8	11.30 P.M.	} No. 10, Aldersgate Street.	..	Yes.	..	..	8-tenths.	..	} Chartered.		
" 9	12.30 A.M.		..	"	..	..	8 "	..			
" 9	1.30 "		..	"	..	..	8 "	..			
" 9	2.30 "		..	"	..	..	8 "	..			
" 9	3.30 "		..	"	..	..	8 "	..			
" 9	4.30 "		..	"	..	..	8 "	..			
" 9	5.30 "	..	"	"	..	8 "	..	..			
Oct. 10	11.5 P.M.	} No. 1, Princes Street.	..	Yes.	..	..	9-tenths.	..	} Chartered.		
" 12	12.5 A.M.		..	"	..	..	8 $\frac{1}{2}$ "	..			
" 11	1.5 "		..	"	..	..	7 "	..			
" 11	2.5 "		..	"	..	..	7 "	..			
" 11	3.5 "		..	"	..	..	7 "	..			
" 11	4.5 "		..	"	..	..	7 "	..			

" 11	12.20 A.M.	Opposite No. 92, Cannon Street.	..	"	9 $\frac{1}{2}$	"	9 $\frac{1}{2}$	..	..	Great Central.
" 11	1.20 "		..	"	9	"	9	..	..	
" 11	2.20 "		..	"	9	"	9	..	..	
" 11	3.20 "		..	"	9	"	9	..	..	
Oct. 10	11.40 P.M.		..	Yes.	8-tenths.		8-tenths.	..	..	Great Central.
" 11	12.40 A.M.	Corner of Laurence Pountney Lane.	..	"	8	"	8	..	..	
" 11	1.40 "		..	"	8	"	7	..	..	
" 11	2.40 "		..	"	7	"	7	..	..	
" 11	3.40 "		..	"	7	"	7	..	..	
Oct. 10	11.45 P.M.		..	Yes.	10 $\frac{1}{2}$ -tenths.		10 $\frac{1}{2}$ -tenths.	..	..	Great Central.
" 11	12.50 "	Opposite No. 7, Crooked Lane.	..	"	10	"	10	..	..	
" 11	1.50 "		..	"	9	"	9	..	..	
" 11	2.50 "		..	"	9	"	9	..	..	
" 11	3.50 "		..	"	9	"	9	..	..	
Oct. 22	8 P.M.	Opposite No. 2, Charlotte Row.	..	Yes.	..		14-tenths.	..	14-tenths.	Chartered.
" 22	9 "		..	"	..		13 "	..	13 "	
" 22	11 "		..	"	..		10 "	..	10 "	
Oct. 22	8.10 P.M.	Opposite Finch Lane, Threadneedle Street.	..	Yes.	..		9-tenths.	..	9-tenths.	Chartered.
" 22	9.10 "		..	"	..		9 "	..	9 "	
" 22	11.10 "		..	"	..		7 "	..	7 "	
Oct. 22	8.15 P.M.	Opposite No. 14, Bishopsgate Street.	..	Yes.	..		8-tenths.	..	8-tenths.	Chartered.
" 22	9.15 "		..	"	..		8 "	..	8 "	
" 22	11.15 "		..	"	..		6 "	..	6 "	
Oct. 22	8.25 P.M.	Opposite No. 132, Leadenhall Street.	..	Yes.	..		8-tenths.	..	8-tenths.	Chartered.
" 22	9.25 "		..	"	..		7 "	..	7 "	
" 22	11.25 "		..	"	..		6 "	..	6 "	
Oct. 22	8.35 P.M.	Opposite Auction Mart, Bartholomew Lane.	..	Yes.	..		7-tenths.	..	7-tenths.	Chartered.
" 22	9.35 "		..	"	..		7 "	..	7 "	
" 22	11.35 "		..	"	..		6 "	..	6 "	

TABLE XII. (continued)—PUBLIC LAMPS.—REGISTER OF PRESSURES OF GAS.

Date.	Time.	SITUATION.	PRESSURE.						Gas Company supplying Lamps.
			Lamps.		With Carburettors.		Without Carburettors.		
			With Meter.	Without Meter.	Inlet.	Outlet.	Inlet.	Outlet.	
Oct. 22	8.40 P.M.	{ Opposite No. 10, Moorgate Street. }	..	Yes.	..	..	..	13-tenths. 13	{ Chartered. }
" 22	9.40 "		..	"	..	..	..	"	
" 22	11.40 "		..	"	..	..	..	"	
Oct. 22	8.45 P.M.	{ Corner of Old Jewry. }	..	Yes.	..	..	..	13-tenths. 13	{ Chartered. }
" 22	9.45 "		..	"	..	..	..	"	
" 22	11.45 "		..	"	..	..	..	"	
Oct. 22	8.50 P.M.	{ Opposite Church Court, Old Jewry. }	..	Yes.	..	..	..	13-tenths. 13	{ Chartered. }
" 22	9.50 "		..	"	..	..	..	"	
" 22	11.50 "		..	"	..	..	..	"	
Oct. 12	6 P.M.	{ Opposite Mr. Keating's, Chemist, St. Paul's Churchyard. }	..	Yes.	19-tenths.	19-tenths.	..	..	{ Great Central. }
" 12	7 "		..	"	19 "	19 "	..	..	
" 12	8 "		..	"	19 "	19 "	..	..	
" 12	9 "		..	"	19 "	19 "	..	..	
Oct. 24	11 P.M.	{ Corner of Milk Street, Cheapside. }	..	Yes.	..	..	9-tenths.	..	{ Chartered. }
" 25	12 "		..	"	..	..	8 "	..	
" 25	1 A.M.		..	"	..	..	8 "	..	
" 25	2 "		..	"	..	..	8 "	..	
" 25	3 "		..	"	..	..	8 "	..	
" 25	4 "		..	"	..	..	8 "	..	
Oct. 24	11.30 P.M.	{ In Jewry Crescent. }	..	Yes.	..	..	8-tenths.	..	{ Chartered. }
" 25	12.30 A.M.		..	"	..	..	6 "	..	
" 25	1.30 "		..	"	..	..	6 "	..	
" 25	2.30 "		..	"	..	..	6 "	..	
" 25	3.30 "		..	"	..	..	6 "	..	
" 25	4.30 "		..	"	..	..	6 "	..	

TABLE XIII.—Abstract showing the total number of defective lights observed by the Police, in the City of London, during the years 1861, 1862, and 1863.

NORTH DISTRICT (CHARTERED GAS COMPANY).			
	1861.	1862.	1863.
Feeble lights	12	4	5
Lights went out	16	36	42
Not lighted during the night	5	11	58
Total.....	33	51	105
SOUTH DISTRICT (GREAT CENTRAL GAS COMPANY).			
	1861.	1862.	1863.
Feeble lights	11	31	12
Lights went out.....	223	468	260
Not lighted during the night	67	145	549
Total.....	301	644	821

TABLE XIII.—(continued.)

ANALYSIS.

REPORT OF CHARTERED GAS COMPANY.						REPORT BY OFFICER OF THE COMMISSION.			
Total No. of defective lights observed by the police.	Carburettor defective.	Light blown out by the wind.	Stoppage in service.	Total No. reported by Gas Company.	Carburettor defective.	Found to burn well.	Stoppage in service.	Total No. returned by Officer.	
1861	nil.	no report.	no report.	no report.	nil.	no report.	no report.	no report.	
1862	nil.	7	17	24	nil.	5	22	27	
1863	nil.	39	46	85	nil.	42	60	102	
REPORT OF GREAT CENTRAL GAS COMPANY.						REPORT BY OFFICER OF THE COMMISSION.			
	Carburettor defective.	Light blown out by the wind.	Stoppage in service.	Total No. reported by Gas Company.	Carburettor defective.	Found to burn well.	Stoppage in service.	Total No. returned by Officer.	
1861	no report.	no report.	no report.	no report.	no report.	no report.	no report.	no report.	
1862	110	180	54	344	28	197	56	281	
1863	97	124	104	325	36	353	387	776	

Copies of the returns of the Police are sent to the Gas Companies; their reports, as to the reason of the defects, are made irregularly, and frequently not at all.

The total number of Public Lamps in Chartered Company's District is 1112
 " " Great Central Company's 1772

The person employed on behalf of the Commission makes examination into the cause of the defect, as far as his other occupations will admit; no one was employed for this purpose until July, 1862.

TABLE XIV.—*List showing the Number and Situation of Lanterns in which Carburettors have ignited. Reported by the Police.*

DATE.		SITUATION.
October	28th, 1862 ..	Opposite No. 58, West Street.
November	27th, „ ..	„ „ 34, Mark Lane.
March	24th, 1863 ..	„ „ 35, Mark Lane.
„	25th, „ ..	„ „ 5, Angel Street, St. Martin's-le-Grand.
„	31st, „ ..	„ „ 2, King Edward Street.
April	2nd, „ ..	Attached to Red Lion Wharf, Greenwich Street.
„	15th, „ ..	Opposite No. 1, Lombard Street.
May	8th, „ ..	„ „ 58, West Smithfield.
June	11th, „ ..	In Plough Court, Seething Lane.
„	16th, „ ..	Opposite Trinity Buildings, Great Tower Street.
July	26th, „ ..	Attached to No. 77, Queen Street.
„	26th, „ ..	„ „ 10, Hart Street.
„	27th, „ ..	„ „ 45, Friday Street.
August	21st, „ ..	„ „ 24, Mark Lane.
„	29th, „ ..	Opposite Messrs. Pontifex, Shoe Lane.
September	4th, „ ..	„ No. 25, Cloth Fair.
„	16th, „ ..	„ „ 20, St. Dunstan's Hill.
„	26th, „ ..	„ „ 5, White Hart Court, Long Lane.
October	5th, „ ..	„ „ White Hart Court, Lombard Street.
„	22nd, „ ..	Attached to Rectory House, St. Olave's, Hart Street.
November	17th, „ ..	Opposite St. Sepulchre's Church, Giltspur Street
January	4th, 1864 ..	Attached to No. 2, Sherborne Lane.
March	23rd, „ ..	„ „ 3, Lombard Street.
April	10th, „ ..	In Queen's Head Court, Giltspur Street.
May	14th, „ ..	Opposite No. 11, Mincing Lane.
August	12th, „ ..	„ „ 19, Castle Street.
September	25th, „ ..	„ „ 79, Upper Thames Street.
November	3rd, „ ..	„ „ 28, Budge Row.
„	28th, „ ..	„ „ St. Peter's Church, Cornhill.

TABLE XV.—Table showing the maximum, minimum, and average amounts of Sulphur contained in the Coal Gas supplied, in the City of London, during the last twelve months, and the number of times the amount of Sulphur has exceeded the quantity sanctioned by Parliament.

QUARTERS ENDING.	CITY OF LONDON COMPANY.					CHARTERED COMPANY.					GREAT CENTRAL COMPANY.				
	Sulphur per 100 feet.			No observation.		Sulphur per 100 feet.			No observation.		Sulphur per 100 feet.			No observation.	
	Max.	Min.	Average.	Total.	In excess.	Max.	Min.	Average.	Total.	In excess.	Max.	Min.	Average.	Total.	In excess.
November, 1863	grs. 40·9	grs. 11·5	grs. 20·5	81	37	grs. 29·7	grs. 13·8	grs. 20·2	81	37	grs. 27·1	grs. 15·2	grs. 20·5	81	42
February, 1864	49·7	16·0	22·0	77	57	33·9	17·2	22·8	77	61	27·6	16·0	20·5	77	41
May, 1864	26·0	17·0	21·0	76	56	33·7	17·3	22·6	76	61	29·0	18·7	22·1	76	65
August, 1864	29·7	15·0	19·6	76	31	27·5	14·4	19·1	76	42	35·0	18·4	22·4	76	70
For one year	49·7	11·5	21·1	310	181	33·9	13·8	21·8	310	201	35·0	15·2	22·5	310	218

REPORT

TO THE

COMMITTEE UPON IMPROVEMENTS

OF THE

HON. THE COMMISSIONERS OF SEWERS

OF THE

CITY OF LONDON

UPON THE

PROJECTS OF THE RAILWAY AND OTHER
COMPANIES, APPLYING TO PARLIAMENT
DURING THE SESSION, 1865,
FOR POWERS TO CONSTRUCT WORKS WITHIN
THE CITY OF LONDON.

BY

WILLIAM HAYWOOD,

ENGINEER AND SURVEYOR TO THE COMMISSIONERS.

January 1865.

LONDON:

PRINTED BY M. LOWNDS, 148 $\frac{1}{2}$, FENCHURCH STREET, E.C.

1865.

*At a Meeting of the Committee upon Improve-
ments of the Commissioners of Sewers of
the City of London, at the Guildhall, on
Friday, 20th January, 1865:—*

The Report of the Engineer and Surveyor, here-
unto annexed, being read,

IT WAS ORDERED—

That the same be Printed, and a copy be sent
to every Member of the Court of Sewers and of
the Court of Common Council.

JOSEPH DAW,
Principal Clerk.

REPORT

UPON THE

PROJECTS OF THE RAILWAY AND OTHER
COMPANIES APPLYING TO PARLIAMENT FOR
POWERS TO CONSTRUCT WORKS

WITHIN THE

CITY OF LONDON.

TO THE HONOURABLE THE COMMITTEE UPON
IMPROVEMENTS OF THE COMMISSIONERS OF
SEWERS OF THE CITY OF LONDON.

SEWERS' OFFICE, GUILDHALL,
20th January, 1865.

GENTLEMEN,

I beg to state that the various Notices served upon your Clerk, which were referred to me last December to report upon, relate to nine projects, the whole of which need Parliamentary sanction before they can be carried into effect, and the promoters of which have deposited Plans and Bills in furtherance of that object.

I have, in pursuance of your reference, examined the whole of the Plans deposited, and also have perused generally the whole of the Bills, and beg now to report to you upon the same.

The projects are of two classes, the one relating to Railways, the other to the formation of Public Buildings for the use of the Crown. The following is a list of them.

RAILWAYS.

The Great Eastern Railway—(additional powers.)

The East London Railway—(Thames Tunnel Line.)

The Metropolitan and South London Railway.

The Metropolitan Railway—(additional Lands, alteration of Western Extension.)

The London, Chatham, and Dover Railway—Railway (No. 1,) New Junctions, Lines, and Widenings, and additional Lands.

The London, Chatham, and Dover, and London and South Western Railway Companies—(additional powers.)

The Eastern Metropolitan Underground Railway.

PUBLIC BUILDINGS.

The Courts of Justice Concentration—(acquisition of Site.)

The General Post Office—(acquisition of additional Site.)

THE GREAT EASTERN RAILWAY—(ADDITIONAL POWERS.)

The Act for the extension of this Railway into Liverpool Street passed last Session of Parliament ; all that the Company proposes this year in respect of the City of London, is to seek powers to take four small detached areas of property—one lying between Liverpool Buildings, Liverpool Street, and Bishopsgate Street—a second between Sun Street and Dunnings Alley—a third in Angel Alley (comprising a Wesleyan Chapel and Sunday School)—and the fourth being All Saints' Church in Skinner Street.

The total area scheduled is two roods, 476 yards, or about half-an-acre, a very small portion only of public way is included in this.

The North London Railway has a Terminus now in course of construction in Liverpool Street ; and it has been arranged that the front line of that structure should be set back so as to leave Liverpool Street sixty feet wide at that spot. For the purposes of the Great Eastern Railway, it is now

proposed to take down the whole of the remaining property on the north side of Liverpool Street, and arrangement should be made by which that thoroughfare shall be widened throughout its entire length to at least sixty feet; indeed, inasmuch as the Termini of the North London and the Great Eastern Railways will both be situated there, as well as a Station of the Metropolitan Extension Railway, and probably also the Terminus of a Line communicating with the southern side of the river by means of the Thames Tunnel, the question will arise as to whether sixty feet will be a sufficient width for the convenience of the traffic which may throng there.

THE EAST LONDON RAILWAY—(THAMES TUNNEL LINE.)

Last year a Company deposited Plans of a project for utilising the Thames Tunnel, by constructing a Railway through it, and by that means connecting certain lines north and south of the Thames. There were to be branch railways, one of which was intended to be carried on a viaduct over Bishopsgate Street, and other streets of the City of London; but the Bill was strongly opposed by the Corporation and others, and was rejected by the Select Committee of the House of Commons, to whom it had been referred.

The present project is very nearly the same, in its main features, as that of last Session; but the portion which immediately affects the City is entirely different in its character. Some of the most objectionable features of the former design being done away with.

The main line of Railway is to commence at or near to the Cambridge Road, in the Parish of Saint Matthew, Bethnal Green, by a junction with the recently authorised line of the Great Eastern Railway, thence it is to cross the Bethnal Green and Whitechapel Roads, and proceed straight to the London Docks, beneath which it is to pass; it is then to be carried through the Thames Tunnel and across fields in Rotherhithe to its termination by a junction with the London, Brighton, and South Coast Railway, at New Cross, in the Parish of Saint Paul, Deptford.

To this main line there are to be seven junction or branch lines, by which means (together with the main line) communications will be effected between the Great Eastern, the London and Blackwall, the London, Brighton, and South Coast, the North Kent, and the South Eastern Railways.

The branch, which directly affects the City, is to enter north of Primrose Street; it is to pass beneath

that street, Skinner Street, Sun Street, and other thoroughfares, to the northern side of Liverpool Street, at which point there is to be a terminus ; it is to be entirely subterranean, and is intended to be formed upon precisely the same line as the Great Eastern Extension Railway, which was authorised last Session, and will be constructed beneath that line of Railway, the authorised level of the rails of the Great Eastern being 18 feet 4 inches *above* Liverpool Street. The proposed level of rails of this Railway to be 16 feet *beneath* Liverpool Street.

The area scheduled within the City is (including public ways) about 7 acres, but this is almost identical with that which is authorised to be taken for the Great Eastern Extension to Liverpool Street ; it, therefore, will not increase, in any degree, the area of property within the City which is to be destroyed for the formation of Railways.

If this line is carried out, it will increase the necessity, which has already been pointed out, for widening Liverpool Street.

By the Bill of the Thames Tunnel Railway of last Session (clause 40), it was proposed to run two trains daily, between their nearest station to and on the Middlesex end, and the nearest station to and on the Surrey end of the Thames Tunnel, at such

hours as might be most convenient to the labouring classes, and at fares not exceeding one penny per passenger for each journey; this was to obviate any inconvenience which might have been experienced by the labouring classes, had they been deprived of the power of going through the Thames Tunnel at the charge of one penny each way.

In lieu of that power, it is proposed, by clauses 48 and 49 of the present Bill, to run one train daily each way, at convenient periods, between Liverpool Street and New Cross, at the charge of one penny for the entire journey. This is to be for the accommodation of artisans, mechanics, and daily labourers only, each ticket to that class is not to be issued for less than one week; the Company also seek powers to ensure that this privilege shall not be abused by other than the labouring classes availing themselves of it; this privilege must be considered as an immense boon for the class for whom it is intended.

THE METROPOLITAN AND SOUTH LONDON RAILWAY.

The object of this Railway is to connect the Metropolitan, the Great Eastern, and the London and Blackwall Railways, on the north side of the

Thames, with the London, Brighton, and South Coast, and the South Eastern Railways, on the south side of the Thames, by means of the Thames Tunnel; the object is, in fact, nearly identical with that of the East London Railway (Thames Tunnel Line), just reported upon, as it connects with all the Railways proposed to be connected by that project, but in addition with the Metropolitan Railway also.

Last year an Act was passed to authorise the extension of the Metropolitan Railway from Finsbury to Tower Hill, which line is to be carried across Finsbury Circus and under the south side of Liverpool Street, thence through property on the north side of Houndsditch and the Minories, beneath Aldgate High Street and Swan Street, and terminate near the Crescent in the Minories; at which point it is to make a junction with the Metropolitan District Railway, which was also authorised last Session of Parliament, and when constructed will complete what is termed the Metropolitan Inner Circle Railway.

The main line of the Metropolitan South London Railway, is now projected to take nearly the same line within the City as the Metropolitan Extension, for it is to be carried from Finsbury Pavement across Finsbury Circus, New Broad Street, and Bishopsgate Street, thence at the back of property on

the north eastern side of Houndsditch to Church Row, Aldgate; at this point it is to quit the line of the Metropolitan Extension, and is to pass beneath Aldgate High Street and Somerset Street, (at which point it passes out of the City); it is then to continue in an easternly direction through the parishes of St. Mary, Whitechapel, and St. George's in the East, to Cannon Street Road; it then turns southward, goes beneath the eastern basin of the London Docks, and proceeds through the Thames Tunnel, and across portion of Rotherhithe, and terminates at Corbett's Lane in the parish of St. Paul, Deptford; from which point two branch lines are to start; the one forming a junction with the London, Brighton, and South Coast Railway, and the other with the North Kent Railway.

There are to be ten junction or branch Railways forming the connections with the trunk and other Railways before mentioned, but none of these branches will be within the City or directly affect it.

Within the City, and indeed throughout the northern side of the River generally, the line is to be subterranean, and the surfaces of the streets under which it passes are to be restored to their present level when the works are completed.

The total area scheduled for this project is about ten acres, which includes about four acres authorised last session to be taken for the Metropolitan Extension Railway,—this area includes portions of the public way.

The whole of the property on the southern side of Liverpool Street is scheduled, and also some property on the northern side of Liverpool Street at the Bishopsgate Street end, which is also scheduled this Session for the Great Eastern Railway.

It is proposed to divert the eastern end of Liverpool Street from its present course, such diversion to commence near Baker's Buildings, and be continued in a straight line and in an easterly direction, and to terminate in Bishopsgate Street at a point a little north of Devonshire Street; the substituted street is to be about thirty-five feet in width.

Powers are sought by the Bill to enable the Company to carry into effect certain agreements with the Metropolitan Railway Company with reference to the construction of so much of their respective Railways within the City as may be contiguous; this is probably with a view to economy, both in the purchase of property, and in the formation of the Railway, and to obviate the incon-

venience of two Railways being formed by two Companies at different periods, but immediately adjacent to each other.

There does not appear to be any provision in the Bill for carrying persons through the Tunnel at the present charge for going through it on foot, nor for cheap trains for the labouring classes.

METROPOLITAN RAILWAY.—(ADDITIONAL LANDS).

This is a Bill to confer powers upon the Metropolitan Railway Company with reference to certain works and lands, and to authorise arrangements with other Railway Companies.

Additional property is proposed to be taken in the City. This is situated on the south side of the Railway, which is now in the course of construction, and lies between Jacob's Well Passage on the West, and Milton Street on the East; nearly the whole of the Debtors' Prison is to be taken, and also the City Green Yard, and one or two small courts in the vicinity of those buildings; a block of property, having a frontage of about 218 feet towards Fore Street, with a depth of 80 feet northwards, is also to be taken.

The total area scheduled is about $2\frac{3}{4}$ acres, which includes portions of the public way.

It does not appear that the surfaces of Whitecross Street and Redcross Street (which are in places scheduled), are intended to be altered in level when the Railway Works are completed.

THE LONDON, CHATHAM, AND DOVER RAILWAY (No. 1), NEW JUNCTION LINES AND ADDITIONAL LANDS.

Within the City, this Company proposes to take the whole of the property, which is bounded on the eastern side by the authorised main line of the Railway now in course of construction from Ludgate Hill to its junction with the Metropolitan Railway, and on the western side by the line of Farringdon Street and Farringdon Road, to a point north of the City boundary.

On the other, or eastern side of the Railway now constructing, it is also proposed to take all the property bounded by the southern side of Fleet Lane by the Old Bailey from Fleet Lane to a point 240 feet southwards, and thence by a straight line running westward from the Old Bailey to the site of the late Fleet Prison.

The total area scheduled is about nine acres, of which a very large portion has either already been scheduled by the Company on former occasions or which the Company already has power to take or is negotiating for or has actually purchased at the present time, or is scheduled for the Holborn Valley Improvement. I find that of the nine acres scheduled the Company already has had powers to take about $6\frac{3}{4}$ acres.

It is proposed to stop up permanently and appropriate Fleet Lane and the diversion of Fleet Lane recently made by the Company by arrangement with the Commission, also to stop up and appropriate Wheatsheaf Yard, Bear Alley, Brazier's Buildings, Newcastle Street, and Turnagain Lane.

The object of the Company, as I am informed, is to increase its station accommodation in connection with the South Western Railway.

THE LONDON, CHATHAM, AND DOVER, AND
LONDON AND SOUTH WESTERN RAILWAY
COMPANIES—(ADDITIONAL LANDS.)

This is a project for enabling the London and South Western Railway Company to contribute towards the undertaking of the London, Chatham,

and Dover Railway Company, to give them running powers over portion of their Line, and to use their Stations, &c., &c.

For this purpose the London and South Western Railway Company has scheduled the same area of property described at page 18, as being scheduled by the London, Chatham, and Dover Railway Company, with the exception of that portion which is bounded by Fleet Lane and the Old Bailey.

Similar powers are also sought with regard to stopping up Fleet Lane and the adjacent Streets and Alleys already enumerated, as are required by the London, Chatham, and Dover Railway Company.

From the Bill it appears to be contemplated to erect a Station for the London and South Western Company, north of Ludgate Hill, and facing Farringdon Street.

THE EASTERN METROPOLITAN UNDER- GROUND RAILWAY.

This has been already reported upon, and the substance of the Report is here given, to bring

together conveniently for reference the whole of the Railway projects for the ensuing Session.

The Railway is to start from a Junction with the Metropolitan Extension Railway at the point where it crosses beneath Aldgate High Street, which is a few yards east of the Minories, thence it is to continue its route along Aldgate to the City boundary, along Whitechapel and the Mile End Road, to the western side of the Regent's Canal: the total length is one mile and three quarters.

It is to be entirely underground; the present surface levels will be unaltered, and the level of the rails within the City will be about thirty-four feet beneath the surface, and the Engineer considers that it will not be needful to open the ground at more than one place in Aldgate, and in such a manner as not to interfere materially with the traffic; two lines of rails only are to be provided for.

There is to be an Exchange Station at the junction with the Metropolitan Extension, and when both Railways are made it would enable a journey between the Bow Road and the West, North, and South of London, to be accomplished without leaving the Railway system. Provisions also have been made to enable a junction to be effected with the

Thames Tunnel lines, for which Bills have this year been deposited, so that a communication between the City and the South East of London, may be had by that route.

Trains for the labouring classes are to be provided; the fares not to exceed one penny per passenger for the whole distance.

Owing to the great depth of the Railway the tunnel would be below the sewer in Aldgate; and it is expected by the Engineer to the Railway that it will be but little disturbed by his works. My opinion is that it will have to be reconstructed; but that its present line and levels may be maintained afterwards and the drainage of the houses need not be interfered with.

This Company is to be formed under the Railway Construction Facilities Act (27 Vic., cap. 121) passed last Session of Parliament; by which it seems that a railway may be, under certain special conditions, constructed under a certificate from the Board of Trade, which, when obtained, becomes incorporated with the Act above named, and the two constitute the Act for the purposes of the Company; the form of Certificate has been deposited by the Company; all objections to it had to be made before the 1st January, 1865.

Clauses in respect of opening and closing pavements, and for reconstructing sewers within the City, and preserving the powers of the Commission have already been agreed to by the Company.

THE GENERAL POST OFFICE—(ACQUISITION OF ADDITIONAL SITE.)

Property is scheduled over an area which is bounded on the south by the northern side of Newgate Street, on the west by the eastern side of Bath Street, on the north by Angel Street, from about seventy feet west of King's Head Court to St. Martin's-le-Grand, and on the east by St. Martin's-le-Grand from Angel Street to Newgate Street.

The total area scheduled is 1 acre, 1 rood, and 368 yards. This comprises 531 yards superficial of public way.

Two subterranean connections are to be made between the new building which is to be erected upon this site and the present General Post Office, these are to be beneath the public way of St. Martin's-le-Grand, but the levels of the roadway are to remain unaltered after the work has been executed.

The removal of the property on the north side of Newgate Street will present a favourable opportunity for completing the widening at the eastern end of that street, which it is probable that the Government contemplates doing.

COURTS OF JUSTICE CONCENTRATION— (ACQUISITION OF SITE).

The title of this Bill bespeaks the nature of the work intended to be performed. The deposited plan shows that a large quantity of property is to be removed. It is bounded on the north side by Carey Street and Yeats Court, on the east by Bell Yard, Fleet Street: on the south by those portions of Fleet Street and Pickett Street which extend from Bell Yard to Clement's Lane, and on the west by Clement's Inn.

The total area, including public ways, is about $7\frac{1}{2}$ acres, of which but five houses only are within the City; the area of the property within the City being but 357 yards superficial.

Plans for this project have now been deposited four different Sessions, the ground included to be taken, being in each Session nearly the same: the only variation between the Plans of this year and

those of last year as regards the City is, that Temple Bar, which was scheduled last year is omitted this year; and one additional house in Fleet Street is included.

If this property is removed, it will present a favourable opportunity for making an important improvement in the public ways of the locality.

The total area, including public ways, scheduled within the City for the several projects reported upon, is about thirty-one acres, but of this about eighteen acres are already authorised to be taken under existing Acts, leaving thirteen acres which are scheduled for the first time, of which about $10\frac{1}{2}$ acres is property, and $2\frac{1}{2}$ acres is public way.

Most of the projects will materially interfere with the sewerage of the districts in which they are intended to be executed; for some of the schemes it is also proposed to stop up or divert important streets, and in all cases it is proposed to absorb for the advantage of the Companies areas of the public ways. Proper arrangements therefore should be made before these Bills pass into Law, (should the Commission determine not to oppose the Railways

upon other grounds), by which the sewerage of the City shall be reconstructed or maintained in a proper condition without loss to the Commission; and as to the areas of existing public ways to be appropriated, that some equivalent shall be given, which the Commission may determine to be the best for the public generally. As to the best mode of securing this, I can only report to you after I have had much further information as to what the Companies propose, and after close investigation of the probable consequences of the completion of the various projects; for the present, therefore, it seems to me absolutely needful that the Commissioners should dissent from the whole of them.

I have the honour to remain,

GENTLEMEN,

Your most obedient Servant,

WILLIAM HAYWOOD,

Engineer and Surveyor.

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R E P O R T

TO THE

HON. THE COMMISSIONERS OF SEWERS

OF THE

CITY OF LONDON,

UPON

WIDENING MANSION HOUSE STREET

AND

THE POULTRY,

BY

WILLIAM HAYWOOD, M. INST. C.E., F.R.I.B.A.,

ENGINEER AND SURVEYOR TO THE COMMISSION.

October 24th, 1865.

LONDON :

PRINTED BY M. LOWND, 148 $\frac{1}{2}$, FENCHURCH STREET, E.C.

1865.

*At a Meeting of the Commissioners of
Sewers of the City of London, held at
the Guildhall of the said City, on the
24th day of October, 1865 :—*

The Engineer and Surveyor laid before the
Court a Report as under:—

ORDERED—

That the same be printed, and a copy be sent to
every Member of this Court and the Court of
Common Council, &c.

JOSEPH DAW,

Principal Clerk.

REPORT
TO THE
HON. THE COMMISSIONERS OF SEWERS
UPON
WIDENING MANSION HOUSE STREET
AND
THE POULTRY.

TO THE HONOURABLE THE COMMISSIONERS OF
SEWERS OF THE CITY OF LONDON.

GUILDHALL,

24th October, 1865.

GENTLEMEN,

The question of widening Mansion House Street having again raised that of widening the Poultry, I beg to lay before you certain points of information which may be useful in considering this important Metropolitan Improvement.

At the present time Mansion House Street during the busy hours of the day is most incon-

veniently crowded by vehicles, yet those vehicles are almost all moving either from the eastern or western direction along the Poultry, and there is but little additional inconvenience caused by vehicles crossing each other's line of route.

The new street from the Mansion House to the Thames Embankment will doubtless create a considerable diversion in this traffic, and the vehicles will then no longer move in nearly parallel, although opposite lines, but will, near to the western angle of the Mansion House cross north and south the lines of vehicles moving east and west; thus, although the Poultry will be relieved from some of its carriage traffic, the confusion and difficulty of transit near to the Mansion House will be increased, and be very great indeed, and will cause much inconvenience to pedestrians as well as to those in vehicles.

This difficulty may be relieved by widening Mansion House Street on its northern side, according to the plan now before the Commission, and it so happens that portion of the ground needed for this improvement, which lies between St. Mildred's Court and the European Tavern, is now uncovered (although the foundation for the new buildings are laid in), and that adjacent

houses to the eastward of it are likely to be pulled down in the course of a few years, thus an opportunity presents itself of carrying out the improvement economically, which, if lost, may never present itself again.

To the westward of this property is the church of St. Mildred, and there is reasonable probability that this church will, at a not far distant period, be removed, and that the portion of its site which will be needed for the extension of the improvement in question can then be acquired upon satisfactory terms.

Now, if Mansion House Street, between this church and Princes Street, be widened, the future difficulty caused by the divergence and interlacing of the vehicular traffic will be much prevented. It is undoubtedly desirable to widen the Poultry; *but this widening of Mansion House Street may be regarded as a substantive and independent improvement of great importance and utility in itself, whether the Poultry be ever widened or not.*

With regard to the direction of the new street, from the Thames embankment, it seems improbable that its projectors should have so designed it as to render the removal of any portion

of the Mansion House necessary to its effective completion, for in such case it cannot be doubted that the Corporation would have been apprised of their intention, by the Mansion House being scheduled and notice being served upon them in the usual form, and certainly in the parliamentary estimates for the street nothing was set down for the removal of any portion of the Mansion House, nor at that time was any suggestion even made that a portion of its site was needed.

But, even should that have been the case, there is as yet no difficulty in altering what must then be regarded as an inadvertence on the part of those who designed the new street, for a divergence of a few feet to the westward would prevent the necessity of taking any part of the Mansion House; none of the property has yet been removed from the northern portion of the street, and the limits of deviation in the parliamentary plan are sufficient to enable it to be so diverted, nor will this divergence in the slightest degree impair the practical utility of the street, nor would its architectural effect be in the least degree injured by it.

Indeed, in an architectural point of view, nothing would be gained by setting back the railings, or

even by removing the portico of the Mansion House, as it has been recently suggested, for the removal of the portico would scarcely improve the vista of the street, while it would destroy one of the finest buildings in London; indeed, nothing but forming the street through the whole of the northern portion of the Mansion House would improve the view of and from the New Street, and this done the convenience of the traffic would be but little better secured than by widening Mansion House Street on its northern side, for it is width and space rather than direction which will be the greatest improvement at this spot. Yet the expense of removing the Mansion House for this purpose (and nothing short of its destruction would suffice) would be enormous as compared with that of widening the northern side of Mansion House Street; every point of consideration therefore tends to show that it is desirable to widen the northern side of Mansion House Street, by seizing the opportunity which now presents itself.

Of the desirability of widening the Poultry there can be no doubt, even although it may be relieved by the New Street of some of its traffic, for at the present time if the whole of its carriageway was flagged over it would give no superfluous convenience to the vast number of pedestrians who

daily pass through it, and the question as to which side is the better to set back alone remains to be considered.

Now, as will be seen clearly by inspection of the plan, a line of improvement on the south side of the Poultry would seem to necessitate its continuation through the Mansion House, and this again raises the question of the expediency of doing so, and of the large sum of money which will be required for such removal: nor would that be sufficient, for (even if it were removed) the banking house of Messrs. Smith, Payne & Co. would then stand forward and would require to be set back also.

Immediately west of Bucklersbury also, the houses in Cheapside curve northwards, and project almost to the line of the south side of the Poultry, and at that point Cheapside is but 10 feet wider than the Poultry, and a southern line of improvement would, therefore, have to be continued through these houses, if it is to be made a complete one; if this were done, the relief to the traffic would be afforded, but it would throw the general line towards King William Street, rather than towards Threadneedle Street and Cornhill.

The northern side of the Poultry and Cheapside

appear, however, to be the most suitable for the line of improvement, for a general consideration of the plan of those thoroughfares, shows that from Ironmonger Lane eastwards, the line of houses gradually inclines to the south, closing up the Poultry to its present width; and if a line be drawn from Ironmonger Lane to a junction with the line of improvement now laid down from Mansion House Street, a general widening would be effected of the most useful kind.

In respect of architectural effect also the gain would be greater, for it is not only shown by the plan, but it may be seen by anyone standing either in the centre or on either side of Cheapside near to Queen Street and looking eastwards, that removing the northern side would open up to view the Bank, the Royal Exchange, and the two contiguous thoroughfares; and on nearer approach, the Mansion House and King William Street, whilst the removal of the south side of the Poultry and Cheapside only would not effect this, but would simply show the Mansion House as an obstruction and to need removal, and that Messrs. Smith, Payne & Co.'s Banking House was an obstruction even if the Mansion House were removed.

It may be added that the property on the north

side of the Poultry and Cheapside has greater depth than that on the south side; it is, moreover, very old, and the period when most of it will be rebuilt is not far distant; and in respect of outlay, therefore, the widening on that side would, I think, be less than the southern side.

It seems, therefore, that in respect of architectural effect, of public convenience, and economy, that the Poultry, and Cheapside, and Mansion House Street, should be widened upon the northern side.

There are three points, therefore, which should be clearly understood:—

1st. That the future pinching-point of the traffic will be in Mansion House Street; that to relieve this, either the houses on the northern side of the way must be set back, or the Mansion House must be pulled down and set back; and that this is an improvement of great public importance, whether the Poultry be ever widened or not.

2nd. That the limits of deviation on the Parliamentary Plans and the present state of the arrangements with regard to the line of new street

between Cannon Street and the Poultry, will admit of the new street being so laid out as to afford the maximum of public convenience without making any part whatever of the Mansion House the cause of obstruction, either real or apparent, and, therefore, if with these facilities for a contrary course it be laid out otherwise, the responsibility will lie with those who have the formation of the new street entrusted to them.

3rd. That widening the northern side of the Poultry and Cheapside will afford the greatest amount of public accommodation—will connect with the best line of improvement of Mansion House Street, which is also upon the northern side—will be in accordance with the general direction of the whole line of Cheapside—will give the greatest architectural effect, and be the cheapest.

I have only now to state that I perceive the building has been recommenced upon the front walls of the houses on the northern side of Mansion House Street, and to suggest that a communication be addressed to the Directors of the Union Bank, asking them to postpone their operations until the Metropolitan Board of Works has signi-

fied to the Corporation and the Commission the course it intends pursuing with regard to this important public improvement—an improvement from which the Union Bank will reap much benefit if it be carried out.

I have the honour to remain,

GENTLEMEN,

Your obedient Servant,

WM. HAYWOOD,

Engineer and Surveyor.

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REPORT

TO THE

COMMITTEE UPON IMPROVEMENTS OF THE

HON. THE COMMISSIONERS OF SEWERS,

OF THE

CITY OF LONDON,

UPON THE

PROPOSED

NEW LINE OF THOROUGHFARE

FOR CARRIAGE TRAFFIC,

BETWEEN

FORE STREET, IN THE CITY OF LONDON,

AND

UPPER STREET, ISLINGTON,

BY

WILLIAM HAYWOOD, M.INS^T.C.E. F.R.I.B.A.

ENGINEER AND SURVEYOR TO THE COMMISSIONERS.

LONDON:

PRINTED BY M. LOWNDS, 148 $\frac{1}{2}$, FENCHURCH STREET, E.C

—

1865.

*At a Meeting of the Commissioners of
Sewers of the City of London, at the
Guildhall, on 5th December, 1865 :—*

The Report of the Committee on Improvements,
dated this day, in reference to the proposed
widening of Moor Lane, being read,

IT WAS ORDERED—

That the Surveyor's Report thereupon, dated
6th October, 1865, be printed, and a copy be sent
to every Member of this Court and of the Court
of Common Council.

JOSEPH DAW,

Principal Clerk.

REPORT
UPON THE
PROPOSED
NEW LINE OF THOROUGHFARE
BETWEEN
FORE STREET, IN THE CITY OF LONDON,
AND
UPPER STREET, ISLINGTON.

TO THE HONOURABLE THE COMMITTEE UPON IMPROVEMENTS OF THE COMMISSIONERS OF SEWERS OF THE CITY OF LONDON.

SEWERS' OFFICE, GUILDHALL,
6th October, 1865.

GENTLEMEN,

I beg to report that I have examined the project referred to me for making a Line of Street for Carriage Traffic from Fore Street, in the City of London, to the Upper Street, Islington, at a point close to the Church of St. Mary, Islington.

At the present time, the direct route for the Vehicular Traffic between the Bank and the pro-

posed termination of the new line of street, is by way of Finsbury Pavement and the City Road as far as to the Angel Inn at Islington, and thence along the High Street and Upper Street, Islington, to the point in question. There is indeed no other route that carriages can take excepting one, which, partly from the extreme narrowness of portions of the thoroughfares, and the way in which they are occupied by local trade, are generally so obstructed that drivers do not use them willingly.

The proposed new route is to be made by connecting existing carriage thoroughfares which are now either separated from each other by blocks of buildings, or only connected by footway passages, and by widening and altering such portions of some of the streets as are of insufficient width.

The alterations are to commence in Moor Lane, which, from Fore Street to White Street, is to be made 50 feet in width by removing and setting back the line of frontage of the property on its western side; and it should be observed that a large portion of the property on the western side of the Lane is already removed by the Metropolitan Railway Company, and that the cost of widening it would be therefore materially diminished by this circumstance.

Between Moor Lane and Type Street there is at present but a narrow foot-passage named Reynolds' Court, the whole of the property on the eastern side of which is to be removed, and a street wide enough for carriages to be formed upon their sites. And as Type Street is already of sufficient width, a complete line of carriage-road would be thus completed between Fore Street and Chiswell Street. The property in Reynolds' Court is of a very inferior character, and the whole of the adjacent neighbourhood would be benefited by the carriage-road being opened through it. The southern end of Type Street is the boundary of the City at that point.

On the northern side of Chiswell Street and opposite to Type Street is Bunhill Row, the whole length of which is already wide enough for carriages; it terminates at Old Street, opposite to a thoroughfare named Bath Street, which also admits of carriage traffic, but which will require to be slightly widened at both of its extremities, and a direct line of carriage-way communication would then be established between Fore Street and the City Road, at a point opposite to Shepherdess Walk; the area required for widening the southern end of Bath Street is not covered by buildings, but is part of a yard, enclosed by the walls of Saint Luke's

Hospital; the ground required at the northern end is covered with shops, some of which project beyond the houses to which they are attached, and could be removed without touching the houses; in the other cases the houses must be taken down, but the property is not of a valuable character.

The south end of Shepherdess Walk, for about 650 feet in length, is at present restricted to the usage of pedestrians, a barrier being placed across it to prevent carriages from passing, and it is indeed too narrow for much vehicular traffic; it is proposed to remove this barrier, and to widen the roadway about 24 feet, by setting back the wall upon its western side, which encloses the ground attached to the Workhouse of St. Luke's Parish, and also by removing the Fore-courts to Lady Lumley's Almshouses upon the eastern side, which project about 8 feet 6 inches for a length of about 94 feet; the remaining portion of Shepherdess Walk, up to the Canal Bridge, is wide enough to admit of carriage traffic, although a small portion near the Bridge, and the Bridge itself might require to be widened, at a future day, if the traffic much increased when the line of Street was opened.

On the other side of the Canal Bridge is Packington Street, which runs directly to Essex

Road or Lower Street, Islington, and which is of ample width throughout its entire length.

On the other side of Essex Street and immediately opposite Packington Street, is a foot-passage termed Church Lane, which runs almost straight into the Upper Street, Islington, this passage is proposed to be widened throughout its length by setting back its southern side, and this would complete the contemplated carriage-road between Fore Street and Upper Street, Islington. I may here observe that it appears to me, the last described portion of the Street might be as effectually formed by using portion of the Churchyard, and thus saving the expense of taking down some of the houses in Church Lane. The Churchyard will never be used again for interments, and no sound objections could be raised to portion of its space being thus utilized.

It is stated that the distance between the City and Upper Street, is about half a mile shorter by this route than by the line of Finsbury Pavement and the City Road ; but I do not know from what points the comparative measurements are taken ; I find, however, that measuring from the Bank, the saving in distance is considerably over a quarter of

a mile, and to passengers going from the City, west of the Bank, the distance saved would be still greater.

The formation of this line of carriage-road would, therefore, be beneficial by saving distance and time of transit between Islington and the City; it would tend to relieve Finsbury Pavement and the City Road of traffic, and upon the occasion when those thoroughfares are stopped up for paving or other purposes would obviate much of the inconvenience consequent thereon; the neighbourhood opened up by it would also be benefited, and it would be certainly specially beneficial to the district of the City with which it directly communicates.

No estimate of the cost has been submitted to me, but much of the ground required for widening the streets is at present uncovered and belongs either to the parishes or to public institutions. I am also informed by the promoters of the scheme that the present circumstances attaching to some of the property required to be taken down, are such as would probably tend to reduce the cost of purchase, if effected shortly, and that the Metropolitan Railway Company would aid the Commission in

carrying out so much of the improvement as is within the City. Under these circumstance, the total cost might be anticipated to be much less proportionately than is usually incurred for similar public improvements.

I have the honour to remain,

GENTLEMEN,

Your obedient Servant,

WILLIAM HAYWOOD,

Engineer and Surveyor.



NOTE. The dark brown line shews the existing route for Vehicles.
The pink line shews the proposed new route.

Scale - Twelve inches to one mile. 1890

26 319

REPORT

TO THE

HON. THE COMMISSIONERS OF SEWERS

OF THE

CITY OF LONDON,

UPON THE

PROJECTS OF THE RAILWAY COMPANIES AND
OTHER BODIES APPLYING TO PARLIAMENT
DURING THE SESSION 1866,
FOR POWERS TO CONSTRUCT WORKS WITHIN
THE CITY OF LONDON.

BY

WILLIAM HAYWOOD, M.INST.C.E., F.R.I.B.A.

ENGINEER AND SURVEYOR TO THE COMMISSIONERS.

16th January, 1866.

LONDON:

PRINTED BY M. LOWNDS, 148 $\frac{1}{2}$, FENCHURCH STREET, E.C.

1866.

*At a Meeting of the Commissioners of Sewers
of the City of London, at the Guildhall,
on Tuesday, 16th January, 1866:—*

The Report of the Engineer and Surveyor, here-
unto annexed, being read,

IT WAS ORDERED—

That the same be Printed, and a copy be sent
to every Member of the Court of Sewers and of
the Court of Common Council.

JOSEPH DAW,
Principal Clerk.

REPORT

UPON THE

PROJECTS OF THE RAILWAY COMPANIES AND
OTHER BODIES APPLYING TO PARLIAMENT FOR
POWERS TO CONSTRUCT WORKS

WITHIN THE

CITY OF LONDON.

TO THE HONOURABLE THE COMMISSIONERS OF
SEWERS OF THE CITY OF LONDON.

SEWERS' OFFICE, GUILDHALL,
16th January, 1866.

GENTLEMEN,

I beg to state that the various Notices served upon your Clerk, which were referred to me last December to report upon, relate to ten projects, the whole of which need Parliamentary sanction before they can be carried into effect, and the promoters of which have deposited Plans and Bills in furtherance of that object.

I have, in pursuance of your reference, examined the whole of the Plans deposited, and also have perused generally the whole of the Bills, and beg now to report to you upon the same.

The projects may be divided into three classes:—

The first relating to Railways.

The second to the formation of Gas Works for the supply of Gas to the City of London.

The third to the Regulation of Traffic within the City.

The following is a list of them.

RAILWAYS.

The Mid-London Railway.

The London, Chatham, and Dover Railway—
(various powers.)

The London, Chatham, and Dover Railway—
(New Lines, &c.)

The Metropolitan Railway—(additional powers.)

The Metropolitan Railway—(Station Collecting
Lines, No. 1,)

The Metropolitan District Railway—(additional
lands.)

The City and London Bridge Railways.

The Great Eastern Railway—(additional powers.)

OTHER SCHEMES.

The City of London Corporation Gas.

The City of London Traffic Regulation Act.

THE MID-LONDON RAILWAY.

This Company seeks power to construct five Railways, which will unite the West London Railway, at Kensington, with the Metropolitan and the London, Chatham, and Dover Railways, in the City of London. Its course generally will be through the heart of the Metropolis, and close to one of the lines of its greatest traffic.

Railway No. 1—is without the City, it starts from a junction with the West London Railway, near Addison Gardens North, and proceeds in a covered way under and along the Uxbridge or Bayswater Road to the northern end of Park Lane.

Railway No. 2—is without the City. It is a branch starting also, by a junction with the West London Railway, at Hammersmith, and joining No. 1 line in the Uxbridge Road.

Railway No. 3—is without the City, it commences at the end of Park Lane, and proceeds in

an easterly direction nearly parallel with, and on the southern side of Oxford Street, through Hanover Square, Regent Street, and terminates at about 150 feet south of Oxford Circus, where it joins the proposed Railway No. 4.

With the exception of very small portions of the Lines Nos. 1 and 2, the whole of these are to be beneath the surface, and pass under the various streets, the levels of which will be unaltered when the works are completed.

Railway No. 4—is partly within the City. It commences at the termination of the Railway No. 3, at Regent Street, and proceeds in an easterly direction, nearly parallel with Oxford Street, passing under Soho Square into High Street, St. Giles's, thence along that street and Broad Street, across Drury Lane to the northern side of Lincoln's Inn Fields, beneath which it is to be carried; thence, by a curve, into High Holborn, near to the northern end of Chancery Lane, and along that thoroughfare to the City boundary near Gray's Inn Lane.

From the City boundary it is proposed to carry the Railway (with such alterations of the levels of the public ways as are hereafter described) in a covered way beneath the line of Holborn to the southern end of Hatton Garden, the rails being at

that spot at a depth of 23 feet below the present surface. It then curves to the north, and crossing beneath Ely Place at the point where the centre line of the new street to Farringdon Road, authorised by the Holborn Valley Improvement Act, is fixed, passes under Farringdon Road, and also the authorised new street from Farringdon Road to St. Sepulchre's Church, and then, curving to the south beneath Skinner Street, forms a junction with the line of the London, Chatham, and Dover Railway, near to Fleet Lane.

Railway No. 5—is chiefly within the City; it commences at a point upon the proposed Railway No. 4, about midway between Hatton Garden and Ely Place, and beneath the authorised new street from Holborn to Farringdon Road. It is carried in a covered way along this authorised street to the Farringdon Road, beneath which it passes. Beyond this point it appears to be in open cutting and passing *over* the London, Chatham, and Dover Railway (which is to be lowered 2 feet at the point of crossing), it forms a junction with Branch No. 13 of the London, Chatham, and Dover Railway, at a point close to the proposed new meat market in Smithfield.

The total length of these Railways which is within the City is 5 furlongs 139 yards.

The area scheduled within the City, including the public ways, is rather more than $11\frac{1}{2}$ acres.

The whole of the lines within the City are likewise to be beneath the surface, and will mostly be covered in.

These Railways will affect the public ways within the City in the following manner:—

The surface of Farringdon Road, which by the Holborn Valley Improvement Act is authorised to be raised 10 feet at the point of junction with the new street to the meat market, is proposed to be raised 12 feet 4 inches, which will increase the gradient of Farringdon Street and Road between Newcastle Street and the new street to the meat market; and it will also increase the gradient of Farringdon Road northwards between the new street to the meat market and Charles Street.

By the 31st section of the Bill, powers also are sought to stop up Field Lane, Snow Hill, King's Arms Yard, and George Court, within the City, which public ways have been authorised already to be stopped by the Holborn Valley Improvement Act.

The streets named are, in respect of the altera-

tions to which they may be subject, now beyond the control of the Commission, inasmuch as under the Holborn Valley Improvement Act, their charge rests with the Improvement Committee of the Corporation of the City of London. The Mid-London Railway scheme will affect the Holborn Valley Improvement in various ways, and the Bill will require the careful consideration of the Improvement Committee.

It is worthy of special notice, that powers are to be taken to form three new streets, each 60 feet in width, over portions of the line. The first is to extend from Bond Street to Hanover Square; the second from Broad Street, Bloomsbury, to the western end of Lincoln's Inn Fields, on its northern side; and the third from the north-eastern corner of Lincoln's Inn Fields to High Holborn, near to the end of Chancery Lane.

These two last-named streets would, therefore, open a new line of carriageway between High Holborn by Chancery Lane and Broad Street, Bloomsbury, passing through Lincoln's Inn Fields, and would greatly conduce to the metropolitan convenience. The formation of these streets does not, however, appear to be compulsory upon the Company.

LONDON, CHATHAM, AND DOVER RAILWAY
(VARIOUS POWERS).

The Company seeks power by this Bill to acquire much property which lies between the River Thames and Ludgate Hill, a small portion being upon the western side, but nearly the whole being upon the eastern side of its station and line at that spot; the ground is needed for station purposes; and although the property scheduled includes that which is also scheduled under the next mentioned Bill—"London, Chatham, and Dover Railway—New Lines—New Streets in the City"—promoted by the same Company, the two are to be treated as distinct schemes.

The area scheduled comprises property now remaining between the Ludgate Hill Station and New Bridge Street to the north of Earl Street. Also a narrow strip of property lying to the east of their railway, and between Earl Street and the River Thames, and a large area of property upon the eastern side of the Ludgate Hill Station, and extending along the southern frontage of Ludgate Hill from the Railway Bridge to a point opposite the east

side of the Old Bailey. The line bounding the property scheduled then turns to the south as far as Pilgrim Street. It avoids the property at the corner of that street and Broadway, and takes the direction of Cob's Court and Church Passage, avoiding the churchyard of Saint Ann, Blackfriars. It continues along the lines of Glass House Yard, Dark Alley, and Printing House Yard. Then turning to the east as far as Printing House Square, it passes along "The Passage" and Printer Street to Earl Street.

The following public ways, or portions of them, are scheduled:—Evangelist's Court, Cob's Court, Pilgrim Street, Broadway, Water Lane, Shoemaker Row, Glasshouse Yard, Playhouse Yard, Dark Alley, Printing House Lane, Huish's Court, Printer Street, Stonecutter Alley, Union Street, Earl Street, Dolphin Court, and Saint Martin's Court.

The whole of the property, within the boundary, including Apothecaries' Hall, would by this Bill be taken, and should it become law in its present form, the whole of the public ways included within the boundaries given, except "The Passage" and a portion of Church Court, but including a short length of Earl Street, might be taken and appropriated by the Company.

The area of the property scheduled for this scheme, including that of the public way, is about $4\frac{1}{4}$ acres.

A notice also has been served upon your Clerk, in relation to this Bill, which refers to the following public ways:—Skinner Street, Snow Hill, King Street, Cock Lane, Hosier Lane, Fox and Knot Court, St. John's Court, West Smithfield, West Street, and Durham Yard.

The Company obtained powers over these ways in their Act of 1864, for the construction of their branch from Snow Hill to West Smithfield; it is now proposed, by the present Bill, to extend the time for compulsory purchase and completion of works on that branch for three years from the passing of the proposed Act, but no additional property is scheduled.

LONDON, CHATHAM, AND DOVER RAILWAY.— (NEW LINES—NEW STREETS IN THE CITY.)

By this Bill the Company proposes to acquire property lying to the east of the station and line at Ludgate Hill, and extending between that thoroughfare and Earl Street.

Power is sought to divert and alter the lines and levels, or to stop up and appropriate for the use and benefit of the Company, the whole of the streets lying between the eastern side of the Company's Station and an imaginary line from Printer Street, Earl Street, to Pilgrim Street, Ludgate Hill.

This comprises the public ways of Pilgrim Street, Cob's Court, Shoemaker Row, Playhouse Yard, Printing House Lane, Huish's Court, the Broadway, St. Martin's Court, Stonecutter Alley, Dolphin Court, Little Bridge Street, Meeting House Court, Evangelist Court, Water Lane, Ship Yard, Fleur-de-lis Court, and Glasshouse Yard.

The area of property and public way scheduled under this Bill is 1 acre 3 roods; the whole of which is included in that scheduled by the Bill for Approaches already described.

In lieu of these public ways so to be stopped up and appropriated, the Company proposes to form the three following new streets:—

1stly. A street about 37 feet wide from opposite the end of the Old Bailey, in Ludgate Hill, in nearly a straight line to the authorised new street to the Mansion House, which it joins near to the point where the Railway bridge crosses Earl

Street. This street is to be in lieu of the thoroughfare of Water Lane.

The length of this new street will be about 670 feet, measuring from Ludgate Hill to the Mansion House Street, and the gradient of the new line of street, so far as it is altered, will be 1 in 30 ; that in Water Lane varying from about 1 in 38 to 1 in 24.

2ndly. An alteration of the level of the present Union Street, and continuation eastward of the same street at its present width to the street No. 1, upon the site of Apothecaries' Hall.

The length of this street will be about 60 feet, and its gradient, where it is not level, will be 1 in 30 ; its present gradients are 1 in 14 and 1 in 23.

3rdly. A street about 20 feet wide, commencing on the western side of Church Entry and running close to the southern boundary of the grave yard of St. Ann, Blackfriars, and terminating by a junction with the new street No. 1, upon the site of Apothecaries' Hall. The length of this street would be about 117 feet, and its gradient 1 in 44·5.

It will be seen that the removal of the property between the Railway Bridge over Ludgate Hill and a point opposite the end of the Old Bailey,

will afford to the Commission an opportunity for continuing the widening of Ludgate Hill already commenced.

By clauses 39 and 40, it appears to be anticipated that some contribution may be obtained from the Corporation towards the making of these new streets.

METROPOLITAN RAILWAY.—(ADDITIONAL POWERS.)

It is proposed by this Bill to obtain power to acquire property in fifteen places, situate chiefly in the western and northern parts of the metropolis, and without the City of London. It is also sought to acquire property in the following places, wholly or partially within the City.

“Lands at P”—on Parliamentary Plans. This comprises property lying wholly on the northern side of West Street, nearly the whole of the area of which has been at various times scheduled by the Metropolitan, and by the London, Chatham, and Dover Railway Companies, and also by the Corporation of London for the purposes of the new streets to the market and the Holborn Valley Improvement.

Parts of West Street and the whole of Sharp's Alley, Durham Yard, and a public passage leading from West Street northwards are also scheduled by the company.

“Lands at T,”—chiefly within the City of London, being on the west side of Farringdon Street and Farringdon Road, extending from Charles Street to the centre of Farringdon Market, comprising nearly all the property which is bounded by Farringdon Road and Street between the points named and by Shoe Lane and Union Court, Holborn.

Portions of the public ways of Farringdon Street, Farringdon Road, Holborn Hill, Union Court, and Field Lane, and the whole of Plum-tree Court and Holborn Place, within the City, are scheduled. At the present time the absolute power over these public ways is, for the purposes of the Holborn Valley Improvement, vested in the Corporation of the City of London.

Much of the property already purchased, and much more that is needed for the Holborn Valley Improvement is therefore scheduled by the Company.

“Lands at M”—on Parliamentary Plans. This

comprises a block of property surrounding Three Tun Court on the east side of Red Cross Street, and another portion of the public way of Red Cross Street, and the whole of Three Tun Court are likewise scheduled.

“Lands at N”—on Parliamentary Plans. These include a block of property lying between the eastern part of Jewin Crescent, Red Cross Street, and Alfred Place. Parts of the public ways of Red Cross Street, Jewin Street, and Jewin Crescent are scheduled.

“Lands at O”—on Parliamentary Plans. These comprise all the property on the southern and eastern sides of Bell Square, Blomfield Street. The public way of Bell Square is scheduled.

“Lands at Q”—This comprises a small property on the east side of Bishopsgate Street, midway between the ends of Houndsditch and Devonshire Street, and adjoining the south side of the authorised limits of the Metropolitan Railway. A portion of the public way of Bishopsgate Street at this spot is also scheduled.

“Lands at R”—on Parliamentary Plans includes property at five different points within the Parish of St. Botolph, Aldgate.

No. 1 Houses abutting on the South side of White Street, Cutler Street, in the Parish of St. Botolph, Aldgate, being an enlargement of the present limits of deviation of the Metropolitan Railway at that spot. The whole of the public way of White Street is scheduled.

2. A property on the south-west side of Ebenezer Square, and adjoining the authorised limits of the Metropolitan Railway. Part of the public way of Ebenezer Square is scheduled.

3. Property on the south-west side of Seven-step Alley, and the east side of Saville Buildings, and Sun Court, and other property adjoining New Street, Amelia Place, Turner's Place, Turner's Square, and Aldgate High Street.

Portions of the public ways of all these streets and places named are scheduled.

4. A property surrounding Three Nun's Yard on the north side of Aldgate High Street, adjoining the authorised limits of the Metropolitan Railway.

Part of Aldgate High Street at this spot is also scheduled.

5. A property adjoining the authorised limits of the Metropolitan Railway, being on the south side of Aldgate High Street, and west side of Chequer Yard.

Portions of these public ways are scheduled.

By the 12th clause of their Bill, the Company seeks power to stop up, and appropriate, and use the soil of the following public ways *within the City*, viz.:—Little Moorfields between Fore Street and Short Street; Three Tun Court in the Parish of St. Giles, Cripplegate; Bell Square in St. Botolph Without, Bishopsgate; and Amelia Place, Sun Court, Turner Place, Turner Square, Chequer Yard Passage, and Saville Buildings.

The total area of the property scheduled within the City of London, including that of the public way, is about $10\frac{1}{2}$ acres.

METROPOLITAN RAILWAY—(STATION COLLECTING LINES.)

Under this Bill it is proposed to form five lines or branches from stations on the Metropolitan Railway, to places situate upon the thoroughfares of Oxford Street, the Mile End Road, and Kensington Road.

No. 1—will extend from the Baker Street Station in the Marylebone Road, and terminate at Oxford Street at the corner of Orchard Street, passing beneath the surface of Baker Street and Portman Square.

No. 2—will extend from the Portland Road Station, near Regent's Park, to the south side of Oxford Street, east of Regent's Circus, passing beneath the surface of Great Portland Street.

No. 3—will commence at the Gower Street Station in the Euston Road, pass beneath the surface of Gower Street, and terminate on the north side of Oxford Street at the end of Bloomsbury Street.

No. 5—will start from the intended station of the Metropolitan Railway, near Thurloe Square, Kensington, and terminate at the Kensington Road.

No. 4—is the only one which directly affects the City, it commences on the north side of Aldgate High Street, upon the authorised Tower Hill Extension of the Metropolitan Railway, and passing beneath the public way of Aldgate High Street, into Whitechapel High Street, continues beneath the Whitechapel Road, until it terminates at the

junction of Cambridge Road with the Mile End Road, near the spot where Mile End Gate lately stood.

The property scheduled within the City for this line, extends along the north side of Aldgate High Street, from Sun Court to the corner of Middlesex Street. The line is to start from the Metropolitan Railway, which is to cross beneath Aldgate, near to Sun Court.

Portions of the public way of Aldgate High Street, Crown Place, Black Horse Yard, Bull Yard, and probably Sun Court, are scheduled.

The present levels of the public ways are to be restored, when the work is completed.

The total area of ground scheduled within the City of London, including that of the public way, is one acre.

No provision appears to be made for forming junctions with the rails of the Metropolitan Railway; and it seems to be the intention of the promoters to construct and work these branches upon what is now known as the pneumatic system, and quite independently of the Metropolitan Railway Company, although in connection with it.

THE METROPOLITAN DISTRICT RAILWAY—
(ADDITIONAL LANDS.)

This Company applies for powers to purchase additional lands in fourteen places within the Metropolis, where they require additional area beyond the authorised limits of deviation fixed by their previous acts.

The properties numbered in the Bill 1 to 5 inclusive, are situate in the western parts of the Metropolis ; those numbered 6 to 14 are within the City.

Nos. 6, 7, and 8, refer to a strip of property lying on the south of, and adjoining the lands which the Company has already obtained powers to take in the Parishes of Holy Trinity the Less, St. James Garlic Hythe, and St. Thomas Apostle. The lands and houses are situate in Little Trinity Lane, Swede Court, Crown Court, Garlic Hill, and Queen Street. Portions of the public way of Swede Court, Crown Court, and Garlic Hill are scheduled.

No. 10—relates to the house No. 60, King William Street, which is at the corner of that street, Fish Street Hill, and Eastcheap ; part of the public way of King William Street, extending round the corner to Fish Street Hill, is also scheduled.

This property adjoins, and is on the north side of the property already authorised to be taken by the Company.

No. 11—refers to property in the Parishes of St. Mary-at-Hill, and consists of the whole of that lying between Love Lane, Eastcheap, and St. Mary-at-Hill, comprising all the remaining property north of the Church of St. Mary-at-Hill, not already authorised to be taken by this Company.

No. 12 is in the Parish of St. Dunstan in the East, and consists of one property, being No. 14 on the east side of Idol Lane, and adjoining the northern limits of the property already authorised to be taken by this Company.

No. 13—is in the Parish of St. Dunstan's-in-the-East, and lies between St. Dunstan's Hill and Harp Lane, to the south of and adjoining to the property already authorised by this Company's Act.

The public way of Copping's Court which is enclosed by this property is scheduled.

No. 14—is in the Parish of Allhallows Barking, and consists of property at the angle of Great Tower Street and Seething Lane; also other property situate further north, and on both sides of

Seething Lane, and extending to Trinity Square, Tower Hill.

The public ways proposed to be interfered with under No. 14, are Black Swan Court, Red Cross Square, Crown Court, Seething Lane, Black Raven Court, and Catherine Court.

The total area of the property scheduled within the City of London, including that of the public way, is about $2\frac{1}{4}$ acres.

CITY AND LONDON BRIDGE RAILWAYS.

This Company proposes to connect the Railways having Termini on the southern side of the Thames at London Bridge, with the City of London. This is to be effected by the formation of two Railways.

Railway No. 1, commences in Southwark, at the corner of St. Thomas's and Joiner Streets, and passes under the London and Brighton and South Eastern Railways, being also below the surface of the streets. It then proceeds to and passes under the River Thames, entering the City at Botolph Wharf Gateway, near to Billingsgate, crossing beneath Lower Thames Street at a depth of 44 feet 3 inches, and proceeding up Botolph Lane beneath

the authorised line of the Metropolitan District Railway, then crossing beneath Eastcheap, it goes up Philpot Lane, turns eastward through private property, and crosses Fenchurch Street at a depth of 42 feet beneath the surface, continues its course beneath the southern end of Lime Street, and passes through private property near the eastern end of Ship Tavern Passage to its termination in that part of Leadenhall Market, known as the Hide Market, at which point the level of the rails is to be 29 feet beneath the surface.

The length of the portion of this line within the City, not including that part which is beneath the River Thames, is about two furlongs three chains.

Portions of the following streets are scheduled, viz.:—Lower Thames Street, Botolph Lane, George Lane, Botolph Alley, Weigh-house Yard, Eastcheap, Philpot Lane, Brabant Court, Fenchurch Street, Lime Street, Ship Tavern Passage, Lime Street Passage, Skinner's Place, Half-moon Passage, Leadenhall Street, and other passages and places in Leadenhall Market, vested wholly or partly in the Commissioners of Sewers.

It is not, however, proposed to alter the existing levels of the public ways or the sewers beneath

which the line crosses, and it does not appear that any part of the public way is sought to be permanently taken by the Company.

Part of the Hide Market appears to be required for station purposes.

Railway No. 2 is wholly within the City. The Parliamentary plans show this railway to be in continuation of railway No. 1, and to extend from Leadenhall Market, proceeding beneath Leadenhall Street, Crosby Square, and Great St. Helen's, thence under Bishopsgate Street and Wormwood Street to a terminus which is bounded by Alderman's Walk and New Broad Street, close to the station of the Metropolitan Railway in Liverpool Street.

This part of the scheme does not, however, appear to be included in the Bill of the Company, and no notices have been served upon the Commissioners in respect of the public ways which it would interfere with temporarily.

This portion of the railway would not require the alteration of the levels of any of the streets named—Alderman's Walk excepted—a portion of which it appears to be intended to take. From Bishopsgate Street (where it would be 34 feet beneath the surface) to Alderman's Walk it rises

rapidly, and at the Walk the rails would be about 8 feet beneath the surface.

I presume that it is intended to work this railway upon the puenmatic principle.

GREAT EASTERN RAILWAY.—ADDITIONAL POWERS.

The Company seeks to take one property only, lying between Sun Street and Dunning's Alley, within the City of London.

No portion of public way is scheduled.

The area of private property scheduled is about 1,024 feet superficial.

CITY OF LONDON CORPORATION GAS WORKS.

This Bill is promoted by the Corporation of the City of London, with a view of supplying the citizens with gas of an increased illuminating power, of greater purity, and at a lower price than that already supplied.

In respect of illuminating power, the gas is to produce, from an Argand burner consuming five cubic feet of gas per hour, a light equal to that from eighteen sperm candles of six to the pound, each burning at the rate of 120 grains per hour; whereas the illuminating power of the gas at present supplied to the citizens is, according to the Metropolitan Gas Act, 1860, only equal to that from twelve sperm candles.

In respect of purity--not more than sixteen grains of sulphur are to be contained in any form in 100 cubic feet of gas. Whereas, by the Metropolis Gas Act, the maximum quantity of sulphur is fixed at twenty grains for every 100 feet of gas.

In respect of price—it is provided that not more than three shillings is to be charged by the Corporation for 1,000 cubic feet of gas, while the price of gas of an inferior degree of purity and illuminating power has for nearly four years past been four shillings and sixpence, and has only recently been reduced to four shillings per thousand cubic feet.

As to Testing.—The Bill further seeks to define more clearly the mode of ascertaining the illuminating power and purity of the gas, that apparently

having been a point not well determined by the Metropolis Gas Act.

As to Meters.—The Corporation takes power to supply meters under certain regulations to all consumers without charge.

The site for the proposed works is on the northern banks of the Thames, near Silvertown, in the Parish of West Ham, from whence the leading mains are to be brought by the principal roads between that point and the City. These leading mains may enter the City both at the Minories and Aldgate High Street.

Powers are also sought to lay down gas mains and pipes throughout the City, and generally to carry on the operations usually carried on by Gas Companies, and that may be needful for the economical supply of gas to the citizens of London.

But by clause 47 of the Bill the rights and powers of the Commissioners of Sewers are reserved.

CITY OF LONDON TRAFFIC REGULATION
BILL.

This Bill is also promoted by the Corporation for the purpose of obtaining powers to more effectually regulate the City traffic.

The part of this Bill in which the Commission is specially concerned is that by which it is rendered lawful for it, with the consent of the Court of Common Council, to construct Bridges and Subways across the streets for the accommodation of foot passengers, and to purchase lands and houses for the purpose of forming approaches to such Bridges and Subways.

The total area, including public ways, scheduled within the City, for the several projects reported upon, is about 32 acres, but of this a considerable portion is already authorised to be taken under existing Acts. Of the area now scheduled, about $23\frac{3}{4}$ acres is property, and $8\frac{1}{4}$ acres is public way.

Some of the Railway projects will materially interfere with the sewerage of the districts in which they are intended to be executed, but generally speaking this will not be the case; for some of the schemes, it is also proposed to stop up or divert

important streets, and in nearly every case it is proposed to absorb for the advantage of the Companies, areas of the present public ways.

Proper arrangements therefore should be made before these Bills pass into law (should the Commission determine not to oppose the Railways upon other grounds), by which the sewerage of the City shall be reconstructed or maintained in a proper condition without loss to the Commission; and as to the areas of existing public ways to be appropriated, that some equivalent shall be given, which the Commission may determine to be the best for the public generally. As to the best mode of securing this, I can only report to you after I have had much further information as to what the Companies propose, and after close investigation of the probable consequences of the completion of the various projects; for the present, therefore, it seems to me absolutely needful that the Commissioners should dissent from the whole of them.

A Table giving general information with regard to the whole of the projects is appended.

I have the honour to remain,

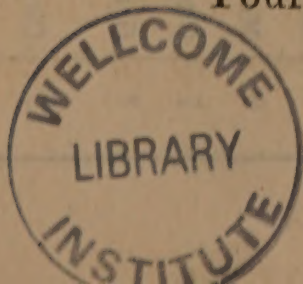
GENTLEMEN,

Your most obedient Servant,

WILLIAM HAYWOOD,

Engineer and Surveyor.

D



	TITLE OF SCHEME.	No. of Public ways interfered with.	Area of Property scheduled.			Area of Streets scheduled.			Total Area.		
			A.	R.	P.	A.	R.	P.	A.	R.	P.
1	Mid-London Railway	13	8	0	14	3	1	30	11	2	4
2	London, Chatham and Dover Railway (various powers)	17	3	1	26	0	3	18	4	1	4
3	London, Chatham and Dover Railway (New Lines, &c.)	11	1	0	24	0	2	32	1	3	16
4	Metropolitan Railway (additional powers)	30	8	1	7	2	0	35	10	2	0
5	Metropolitan Railway (Station Collecting Lines) No. 1.	5	0	2	11	0	2	2	1	0	13
6	Metropolitan District Railway (additional lands)	18	1	3	2	0	1	24	2	0	26
7	City and London Bridge Railways	17	1	2	21	0	2	36	2	1	17
8	Great Eastern Railway (additional powers)	..	1,024	feet.	..	..	..	..	1,024	feet.	..
9	City of London Corporation Gas	..	..	..	..	..	..	..	..	..	..
10	City of London Traffic Regulation Act, 1866	..	..	..	..	..	..	..	..	..	..

Powers under these acts are to extend over the whole area of the City.

